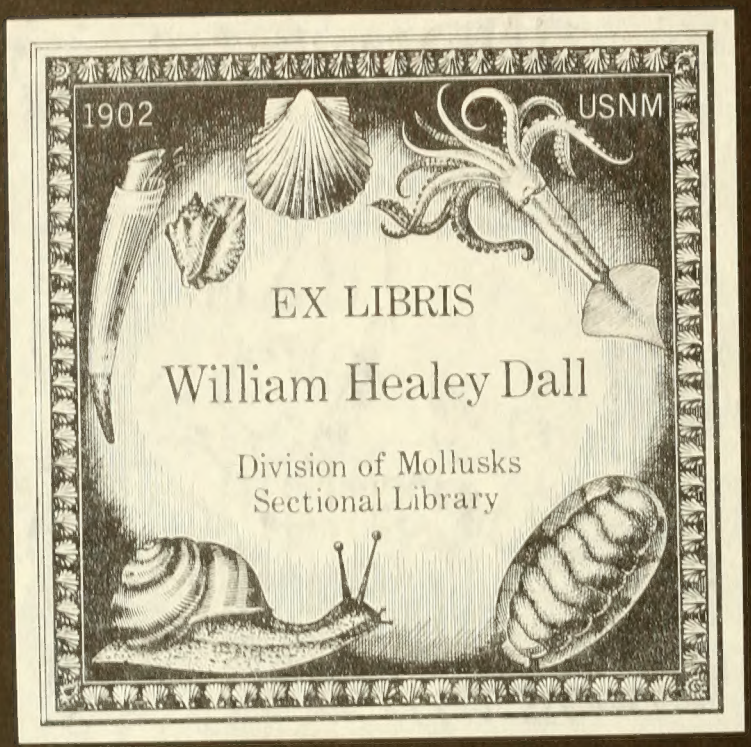
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NATIONAL ANTARCTIC EXPEDITION

1901-1904

NATURAL HISTORY

VOL. VI.

ZOOLOGY AND BOTANY

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PREFACE TO VOL. VI.

With the issue of Volume VI the Report on the Natural History specimens collected by the 'Discovery' National Antarctic Expedition (1901–4) is brought, for the present at least, to a close; Volumes I–III appeared in 1907, Volume IV in 1908, Volume V in 1910.

The present volume was to have included an account of the Polyzoa; the specialist to whom the specimens were submitted has, however, been prevented from completing it as soon as he had hoped, and it was decided to issue the volume without the paper in question rather than delay further the publication of the rest of the contents.

The thanks of naturalists are due to the numerous workers who, by their careful study of the material and by their detailed descriptions, have added to our knowledge of the Animals, Plants and Minerals found in a part of the Antarctic region.

A word of acknowledgment is also due to the sub-editor of the Zoological and Botanical Reports, Mr. F. Jeffrey Bell, for the care and judgment with which he has done the work entrusted to him more than seven years ago; during that space of time he has been charged with the distribution of the zoological and botanical specimens to the various investigators, obtained the reports from the respective authors, prepared the manuscript for the printers, revised the proof sheets, and supervised the preparation of the numerous plates and other illustrations.

L. FLETCHER,
Director.

British Museum (Natural History),
February 29th, 1912.

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FRESHWATER ALGÆ.

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A GENERAL NOTICE OF THE BIOLOGICAL MEMOIRS.

The completion of these fifty memoirs, descriptive of the fauna and flora of that part of the Antarctic area which was visited by the 'Discovery,' under the command of Captain Scott, R.N., C.V.O., offers a suitable opportunity for saying a few words on the collections that were obtained, and for suggesting some general reflections on the inhabitants of the area that was studied.

First of all we have to note the extraordinary differences between the North and the South Polar regions; in the one there is the polar sea, in the other solid land. In the one case, the surfaces of its solid places are dominated by rapacious Carnivores which, ever hungry in such climes, have compelled all defenceless animals to assume the same colour as themselves and the snow on which they live. In the other, the absence of aggressors allows the Penguins to assume the splendid and beautiful colourations which are so well shown in Dr. Wilson's admirable drawings.

The Antarctic region, instead of being, as we might imagine, with its inhospitable climate, almost devoid of life, teems with species, of which 227 new forms are described in these volumes. Of some Amphipoda Mr. Hodgson writes—"It was quite the usual thing to take 10,000 to 30,000 at a haul." And the collection of the 'Discovery' Schizopoda contained one species which was represented by nearly 10,000 specimens. Students of Professor Ehlers' report on the Polychæta will have only a faint idea of the number of specimens of *Harmothoe spinosa* brought back by the Expedition.

The Alga *Lessonia grandiflora* was found to have a lamina as much as 24 feet long; on the other hand, M. Cardot noted that most of the species of Mosses showed signs, which he has detailed, of the severity of their struggle for existence. With the exception of some Algæ, no freshwater organisms were obtained by the 'Discovery' Expedition.

On parting with these reports, it may be appropriate to say a few words on what has most struck me, in the prolonged and studious attention that I have given to them. First of all there stands out the observant care of their duties by Mr. Hodgson and Dr. Koettlitz as collectors, under conditions always of discomfort, and often of danger. In the second place, one cannot but be impressed with the varied attainments that Dr. Wilson brought to the tasks that he had to perform; of his memoirs it may be said that they breathe the true spirit of the intelligent lover of animals, and they raised a number of interesting questions which made another visit to the Antarctic regions a necessity for their solution. Dr. Wilson is not only a naturalist, but he also possesses great power over brush and pencil, and his drawings added considerably to the attractiveness of Volume II. I shall not enter at any greater length into Dr. Wilson's observations on Birds, for any zoologist who has not yet read them should make himself acquainted with them at once. The same is true of his report on Whales and Seals, the skins of which were brought home in excellent condition.

Morphological observations of considerable interest are to be found in the memoirs on the embryos of seals, the development of the feathers of the penguins, and the account of two new species of *Cephalodiscus*, whose possession of a notochord and gill slits indicates a possible affinity to Man that would not be expected at first sight.

Special attention should also be called to the two reports on Echinoderm Larvæ which open up several points of general interest.

Turning to the more strictly systematic memoirs I have to note that two new sub-families have been created, both for Calcareous Sponges. In the zoological reports 23 new genera are proposed, but none among plants; there appear to be 201 new species of animals, and 26 of plants. As to the validity of the new species, specialists alone can judge, and even these, as we know, differ among themselves. I may suggest that another collection should be treated, not so much as one containing new forms, but as one which, from the very conditions under which it would be brought together, must offer an admirable opportunity for the study of variation. I congratulate myself, at any rate, that the collection of Echinoderms fell into my hands, for I tremble to think how many species some other workers would have made, as a result of the bewildering amount of variation exhibited by some of the forms.

On the whole the naturalists, with the possible exception of Sir Charles Eliot, K.C.M.G., who have contributed to these reports, do not appear to have been struck by any resemblance between the faunas of the North and South Poles, and it was therefore with some astonishment that I received late last year an important memoir, by Professor Théel, urging the evidences of "bipolarity" manifested by the Priapulids and Sipunculids collected by the Swedish Antarctic Expedition. To this, of course, I can here only draw attention.

It may be remembered that one of the first objects of interest in the whole collection was the ten-legged Pycnogonid or sea spider found by Mr. Hodgson; it was a curious illustration of the lacunar knowledge of zoologists that it was some time before a person was found who knew that a ten-legged sea spider had been discovered many years ago by Mr. Eights, and described by him under the quite unintelligible name of *Decolopoda*. But, although the form from off Victoria Land has ten legs, it differs in no other important point from the common genus *Nymphon*, while Eights's genus, which had marked peculiarities, was found by the Charcot Expedition in another part of the Antarctic.

It may be observed that there are striking differences between the fauna of the area explored by English and that examined by French, German, and Swedish navigators, but the time for an explanation of these has hardly yet come.

Most of the contributors to the biological volumes bear names well known to zoologists or botanists; it has been to me an especial privilege that I have had the opportunity of introducing to zoological work and zoological workers Mr. C. F. Jenkin, who is now Professor of Engineering in the University of Oxford.

Common treatment has been followed in the nomenclature of both plants and animals.

F. JEFFREY BELL.

British Museum (Natural History),
Department of Zoology.

NATURAL HISTORY

OF THE

NATIONAL ANTARCTIC EXPEDITION,

1901-1904.

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ECHINODERMA.

III.—ON A COLLECTION OF YOUNG HOLOTHURIOIDS.

By Professor E. W. MacBride, D.Sc., LL.D., F.R.S.,
Imperial College of Science.

(2 Plates.)

In 1908 Professor Jeffrey Bell asked me to report on a collection of young Echinoderms, which had been collected by the National Antarctic Expedition. When these came to hand, they proved to be the post-larval stages of a Holothurioid. To this collection was added a specimen of the Auricularia larva of some Holothurioid, the first to be reported from Arctic or Antarctic waters. In an earlier report (5) by Mr. Simpson and myself on the Echinoderm larvæ of the Antarctic Expedition we described for the first time the occurrence of the free-swimming larvæ of Echinoidea and Ophiuroidea in Antarctic waters. We can now assert the existence of three out of the four types of free-swimming Echinoderm larvæ in these waters. This is important in view of the opinion which has been expressed that all Echinoderms in Arctic and Antarctic waters had developments of the shortened embryonic type without free larvæ. I shall, first of all, consider this interesting specimen, and then detail the results of my work on the post-larval stages which were contained in the collection.

I. Auricularia antarctica.

(Plate I., fig. 1.)

This unique specimen is distinguished above all by the large number of wheel-shaped calcareous bodies which it contains. These are distributed all over the body, but are perhaps most numerous in the anal "field." Each consists of a concave bowl, the sides of which are composed of 11 to 13 "spokes" connected by a rim. At the bottom of the bowl is the hub which projects slightly into the concavity (fig. 2). Where a view can be obtained from the convex side the hub is seen to consist of a coarse network of calcareous substance. Similar calcareous bodies, but with a larger number of spokes, are described from the larva of *Synapta digitata,* but this larva differs from that under consideration in the fact that its

"wheels" are few in number and confined to the lateral processes, 1–6 in each, whereas in our larva they are extremely numerous. Numerous "wheels" with 13–16 spokes are described by Prof. Chun (2) in a peculiar Auricularia which he fished up at Orotava at the Canary Islands, and which has been named *Auricularia nudibranchiata* by Dr. Mortensen (8).

A few words upon the general anatomy of the Auricularia larva may not be out of place here. As all zoologists are aware, it possesses, like other Echinoderm larvæ, a thickened band of ciliated ectoderm as locomotor organ, and this band has the form of a folded loop, the longest axis of which is parallel to the long axis of the larva; in a word, the loop has two long parallel sides and shorter anterior and posterior cross-pieces connecting them. The anterior cross-piece is folded backwards, so as to form a frontal loop surrounding the forehead or **"frontal field,"** whilst the posterior cross-piece is folded forwards so as to surround an **"anal field"** in which the anus opens. This loop may be termed the anal loop. The adjacent portions of the frontal and anal loops are termed by Dr. Mortensen ("Quersäume"), which we may translate as anterior and posterior **"transverse bars."** The mouth is situated in a depression between the anterior and posterior bars termed the **oral field.** The ciliated band, in addition to the re-entrant frontal and anal loops, is produced into a number of "processes" which are homologous with the arms of the Echinopluteus and Ophiopluteus larvæ. Of these the **præ-oral** processes are developed from the sides of the frontal loop; and the **post-oral** processes from the sides of the anal loop. Where the frontal loop passes into the sides of the ciliated band, there are developed the **antero-dorsal** processes. From these same lateral portions of the band are developed further back **intermediate-dorsal** and **postero-dorsal** processes. Finally, where the anal loop passes into the lateral portions of the band, we have the **postero-lateral** processes. These last, in the opinion of Johannes Müller, showed a resemblance to the human ear, whence the name "Auricularia" was coined to designate the larva.

We have seen that *A. antarctica* cannot be identified with the larva of *Synapta digitata*, since in the latter the "wheels" are few in number and are confined to the processes (1–6 in each). But there are other differences scarcely less striking. In the larva of *Synapta digitata* the outline of the ciliated band is flowingly sinuous, none of the processes being very strongly marked, whereas in our larva the processes are marked off by deep re-entrant folds and show some secondary plications. Then the spot where the frontal loop passes into the lateral portions of the ciliated band is at the anterior pole in the larva of *Synapta digitata*, but in our larva it is displaced far back on to the dorsal surface. The oral field is comparatively broad in the larva of *Synapta*, but in our larva it is reduced to a narrow slit, the anterior transverse bar actually overlapping the posterior bar at the sides. On the other hand our larva resembles the Orotava larva not only in the great number and wide distribution of the "wheels," but in the displacement of the point of union of the lateral part of the ciliated band with the

frontal loop on to the dorsal surface, and also in the narrow oral field. But there are, nevertheless, irreconcilable differences between the two forms. The ciliated band of the Orotava larva in its lateral portions is produced into numerous secondary processes, so that the whole animal acquires the appearance of a Nudibranch mollusc, whence the name *A. nudibranchiata.* Further, in this larva the post-oral processes are absent, but these are well marked (Plate I., fig. 1) in our larva, and though the primary processes are deeply marked there are no tag-like secondary processes such as exist in *A. nudibranchiata.*

In spite of its considerable size (4 mm. long) our specimen is a young larva, for the cœlom is still in the form of a single unpaired vesicle (*coe.*, fig. 1) communicating with the exterior by a pore-canal.

Reviewing all the evidence, we arrive at the conclusion that our larva is a new type of *Auricularia*, to which the specific name "*antarctica*" may be given. It probably belongs to some large Holothurioid of the group Synaptidæ.

II. Post-larval Stages of Cucumaria sp.

The specimens composing this collection were mostly in a state of such intense contraction that their shape approximated to that of a sphere, but a few were considerably less contracted, and of these sections and whole mounts were made.

In Pl. I., fig 3, one of the most successful of the whole mounts is shown. It will be seen that at the oral end of the body there is an atrium overarched by five valves, recalling the vestibule of a young Crinoid. In the intervals of the valves glimpses of the buccal tentacles can be seen. Of these there are ten, as we learn from transverse sections. The suckers of tube-feet can be seen to be developed along three radii.

But the most striking feature in the preparation is the presence of numerous calcareous plates embedded in the skin, so numerous indeed as to constitute a veritable cuirass, especially over the dorsal surface; the plates do not touch edge to edge but overlap. Each oral valve is supported by a special plate. Between the rows of tube-feet there are also calcareous bodies to be found, but these are not fully formed plates. Through the semi-transparent tissues the outline of the alimentary canal can just be made out, and we can observe the thick œsophagus, the long stomach, and the slightly bent intestine.

Now the identification of these specimens as the young of some species of *Cucumaria* rests (i) on the number and shape of the buccal tentacles, (ii) on the nature of the calcareous plates embedded in the skin.

With regard to the first point, *Cucumaria* is characterised by the possession of ten "dendrochirote" buccal tentacles, i.e., tentacles which exhibit scattered lateral branches. Further, these tentacles are devoid of specially developed ampullæ, but on the contrary the whole tentacle ring can be retracted as an introvert. With regard to the

second point, the occurrence of "Gitterplatten" (lattice-plates) as calcareous bodies is of common occurrence in the genus *Cucumaria*. Now, in the number of tentacles, the presence of an introvert, and the shape of the calcareous bodies our specimens resemble *Cucumaria*. In the presence of tube-feet on only three radii, they resemble *Psolus* [and *Colochirus*, F.J.B.], but in *Psolus* the body is flattened on one side so as to form a creeping sole, whereas in our specimens the body is almost cylindrical, as in *Cucumaria*. But to me the strongest evidence of their relationship to this genus is seen in their resemblance to the young *Cucumaria*—probably *C. lactea*, which I obtained at Plymouth in 1905, one of which is shown in fig. 4. Here too we find that the tube-feet are not developed on all the interradii, but are confined to two. Prof. Ludwig (4) notes that in the development of *C. planci* a pair of tube-feet are formed at the termination of the median ventral water-vascular canal and remain for a considerable time the only tube-feet. These two terminal tube-feet are clearly marked in transverse sections of our specimens (Pl. II., fig. 8c).

Our specimens, then, belong to the genus *Cucumaria*, but they show as yet no obvious traces of the characteristic pulmonary trees. They are, however, quite adult in their mode of obtaining food, for the stomach is filled with the half-digested remains of Algæ.

It would seem that a similar stage occurs in the development of *Stichopus japonicus*. Professor Mitsukuri (8) has found that the just metamorphosed form has "a coat of armour," consisting of "disked tables with tall spires united by several cross-beams, which cover the body thickly, their bases even overlapping one another when slightly contracted. The ventral pedicels were in three rows."

Pl. I., fig. 5 shows a longitudinal sagittal section through a specimen in which the course of the alimentary canal is quite straight, and in which both mouth and anus are involved. No endeavour has been made to represent the histology, but the general relationships of the organs are clearly shown. The mouth leads into an œsophagus surrounded by a very thick layer of muscles. On this follows a long conical stomach filled as noted above with Algæ. The stomach leads through a short intestine into the thin-walled cloaca which is attached to the sides of the body-wall by muscular strands traversing the cœlom. I was at first inclined to think that our specimens might be older stages in the development of *Cucumaria crocea*, the embryos of which have been described by Mr. Simpson and myself (6). But this cannot be the case, for in these embryos the alimentary canal is already folded. The stone-canal ends blindly in a thin-walled sac (*ax.*, fig. 5) embedded in the body-wall; there is no pore-canal leading from this sac towards the exterior such as was described by Mr. Simpson and myself in the case of the embryos of *Cucumaria crocea* in an earlier report, nor is there as yet any communication with the body-cavity such as exists in the adult Holothurians. This sac corresponds to the **axial sinus** of other Echinoderms.

The **genital base** (Pl. I., *g. b.*, fig. 5), from which spring the rudimentary genital organs, may be seen close to the stone-canal, but there is as yet no genital

duct. There is little doubt that this genital base corresponds to the genital stolon of other Echinoderms. In a transverse section through the region of the tentacles there is to be seen in each of the other four interradii a mass of deeply staining rounded cells (Pl. II., fig. 8a). The masses are attached to the body-wall, and their component cells in some cases show a tendency to group themselves round a lumen. Is it possible that these are vestigial antimeres of the genital organs destined to be absorbed? Our material does not allow us to answer this question, as it shows neither the origin nor the fate of these structures. In the body-wall on the right hand side of the section may be seen sections of rudimentary tube-feet. The tip of the tube-foot, that is, the disc of sensory epithelium, appears as an invaginated cup (*pod. ect.*, figs. 5–8, Pl. II.)—quite distinct from the outgrowth from the radial-canal, which forms the inner part of the organ (*pod. end.*, figs. 5–8). From the radial nerve-cord proceeds a pedal nerve, accompanied, like the nerve from which it took its origin, by an epineural space.

On each side of the mouth sections of the nerve ring are seen, outside of which are sections of the epineural ring (*ep.*), but there is no perihæmal ring. The buccal tentacle on the right side is seen to be retracted into a pocket of the oral disc (*or.*); on the left side a section of one of the five valves of the oral vestibule is seen.

As we examine similar sections through older specimens the same features can be made out, and the alimentary canal gradually acquires the characteristic curvature into three loops so well marked in the adult. The stomach remains straight and the main portion of this curvature is due to the lengthening of the intestine. In the latest stage which I found in the collections, a thin-walled outgrowth of the rectum on one side (*pul.*, fig. 7) may be regarded as the rudiment of the **pulmonary trees** and *a duct connects the axial sinus with the cœlom. This is the beginning of the "secondary madreporite" so characteristic of the adult* (*mad.*, fig. 6).

If we turn to transverse sections we see in fig. 8a the ten buccal tentacles surrounding the mouth. In fig. 8b, a section taken lower down, we can see sections through the five radii. In each we observe a section of the nerve cord, external to which is the epineural canal. Internal to it we find a space lined by a thin flat epithelium, the radial perihæmal canal. Internal to this is the radial water vascular canal, and this is present in each radius, although only in the three ventral are sections of tube-feet recognisable. In the adult *Psolus*, according to Professor Ludwig (3), the two dorsal radial canals are absent. When the radial canals are followed in successive sections to their tips they do not, as in Echinoidea, Asteroidea and Ophiuroidea, end in terminal azygous tentacles, but terminate within the body-wall.

The most distal tentacles are laterally placed outgrowths of the median of the three radial canals which bear tube-feet. These are shown in fig. 8c, which represents a section from the same series taken near the posterior end of the body.

When we review the account that is here given of these post-larval Holothurians, we are, I think, confronted with a certain number of Echinoid features.

The almost complete dorsal cuirass of overlapping plates certainly suggests the corona of an Echinoid, especially if we recollect that, in the earliest Echinoids, the number of rows of plates in the corona was indefinite in number and the plates overlapped.

The closed axial sinus is another Echinoid feature.

Some investigators have made an attempt to show that Holothurioidea are widely separated from the rest of the Echinoderma. From the development of *Synapta digitata*, the only Holothurian in which the life history has been thoroughly worked out, it has been argued that since in this form the primary evaginations of the water-vascular rudiment give rise to the buccal tentacles, whilst the radial canals owe their origin to secondary evaginations alternating with these, the radial canals of Holothurioidea are not homologous with those of other Echinoderms. But in our specimens the canals occupying the interior of the tentacles can be traced into continuity with the radial canals. The fact is that *Synapta* is about the worst form that could have been chosen to represent the Holothurioidea. Its radial water-vascular canals are only transitory larval structures, and its buccal tentacles not only spring directly from the water-vascular ring, but, in contravention of the rule which prevails in all the other groups of Holothurioidea, their number is no longer a multiple of five. The functional importance of the buccal tentacles leads to their early appearance in ontogeny, before the transitory radial canals appear. Professor Ludwig, who worked out the early development of *Cucumaria planci* (4), points out that in this form the first tentacles spring from the radial canals.

If we compare the youngest post-larval form with the *Auricularia* which was described in the beginning of this paper, we see that the alimentary canal in both is very similar. The long stomach obviously corresponds in each case, as does the short intestine. The short thick œsophagus of the post-larval form corresponds to the inner part of the œsophagus of the *Auricularia*, whilst the shallow outer part becomes (as we know from the life-history of other *Auricularia*) the oral vestibule.

The chief difficulty in the way of deriving Holothurioidea from a primitive form of Echinoidea has lain in the difference between the *Echinopluteus* and *Auricularia* larvæ, and the apparent retention by the latter of more primitive features than those shown by the *Echinopluteus*. I have shown elsewhere (5) that the stomach and intestine of the *Echinopluteus* are directly converted into the stomach and intestine of the young Echinoid. Further, in our specimens the stomach remains unchanged in shape as growth proceeds, and the looping of the alimentary canal is due solely to the growth in length of the intestine. This is also true of the *Echinopluteus*. The "amniotic space" in the *Echinopluteus* inside which the oral disc of the young Echinoid is formed corresponds to the oral vestibule of the *Auricularia*—the difference between the two cases being that in the latter

form the oral vestibule at the moment of metamorphosis, as Mr. Bury (1) has shown, deserts its original median position and moves to the left side of the larva, whilst in the *Echinopluteus* the original larval œsophagus disappears and a new "œsophagus" is formed on the left side of the larva. This is undoubtedly the more modified development, but in respect of the history of the cœlom the *Echinopluteus* has retained a far more primitive arrangement than the *Auricularia*. The fact that the original mouth is retained in *Auricularia* whilst it is lost and re-formed in *Echinopluteus*, is paralleled by the fact that the mouth is retained in the *Ophiopluteus* larva, but lost and re-formed in the more primitive Bipinnaria larva, yet no one would doubt that an Ophiuroid is derived from an Asteroid. Doubtless in the primitive Echinoids from which the Holothurioidea diverged the larval mouth was retained.

If, then, we accept provisionally the hypothesis that the Holothurioidea are descended from primitive Echinoidea, a plausible physiological reason can be suggested for their evolution. If ordinary regular sea-urchins be studied in their natural surroundings it will be noticed that they frequent by preference crevices among rocks and the vertical faces of rocks, where the numerous tube feet borne by their long radial canals can take hold. Now from habits of climbing the transition to habits of wriggling through narrow crevices and of burrowing is easy, and what little is known of the habits of Holothurioidea points to the conclusion that their normal habits are of this kind. I have myself dug up *Synapta inhaerens* from its burrows in the mud, and Professor Mitsukuri (8) records that piles of stones are made in order to collect *Stichopus japonicus*, which is one of the species used for food and known as Trepang.* Such habits would require an increase in the muscularity of the body-wall and a disappearance of the corona, and thus the distinctive features of Holothurioid anatomy would appear to have been evolved.

* Compare F. D. Bennett's account of the habits of the Trepang, 'Whaling Voyage' (1840), i., p. 175: "They usually lie exposed in the shallow waters, though we have very often seen them buried in beds of coral sand, their plumy tentacles being alone exposed, and floating in the water above, apparently as a lure for prey. Some may also be observed lying on the rocks, their bodies completely encrusted with coral sand, which may either have been accumulated by a previous burrowing, or thus used as a disguise."—F. J. B.

LIST OF WORKS REFERRED TO IN Prof. E. W. MacBRIDE'S REPORT ON A COLLECTION OF YOUNG HOLOTHURIOIDS.

(1) Bury, H. The Metamorphoses of Echinoderms. Q. J. Micr. Sci. Vol. 38 (1895).
(2) Chun. Atlantis. Biologische Studien über pelagische Organismen. Bibliotheca Zoologica. Heft 19 (1896).
(3) Ludwig, H. Echinodermen in Bronn's Klassen und Ordnungen des Thierreichs. Bd. II., Abt. 3, Buch 1. Die Seewalzen. 1889–1892.
(4) Ludwig, H. Zur Entwickelungsgeschichte der Holothurien. Sitzungsber. d. Berliner Akad. d. Wissensch., 1891.
(5) MacBride, E. W. The development of *Echinus esculentus*, together with some points in the development of *E. milaris* and *E. acutus*. Phil. Trans. of the Royal Society. Vol. 95 (1903).
(6) MacBride, E. W., and Simpson, J. A. Report on the Echinoderm larvæ of the National Antarctic Expedition. Vol. IV. (1908).
(7) Mitsukuri, K. Notes on the habits and life-history of *Stichopus Japonicus:* Annotationes Zoologicae Japonenses. Vol. V., Part I. (1903).
(8) Mortensen, Th. Die Echinodermenlarven der Plankton-Expedition, etc. Ergebnisse der Plankton-Expedition der Humboldt-Stiftung. Vol. II. J. (1898).

DESCRIPTION OF PLATES I. and II., ILLUSTRATING Prof. E. W. MacBRIDE'S REPORT ON A COLLECTION OF YOUNG HOLOTHURIOIDS.

LIST OF ABBREVIATIONS.

ax.,	Axial sinus.	*œs.*,	Œsophagus.
circ. w.	Water ring	*or.*,	Oral pocket into which one of the buccal tentacles is retracted.
coe.,	Coelom.		
d.v.,	Dorsal blood-vessel.	*ped. gang.*,	Pedal ganglion.
ep.,	Epineural canal.	*perih.*,	Perihæmal canal.
g.?,	Problematical interradial group of cells resembling a young gonad.	*pod. ect.*,	The ectodermal disc of a tube-foot forming in its retracted state a cup.
g.b.	Genital base.	*pod. end.*,	The endodermal canal of a tube-foot.
gon.	Gonad.	*Pol.*,	Polian vesicle.
int.,	Intestine.	*pul.*,	Rudiment of pulmonary trees.
mad.	Rudimental internal madreporite.	*rect.*	Rectum.
musc. circ.,	Circular muscles of œsophagus.	*r.w.*,	Radial water-vascular canal.
musc. rad.,	Radial muscle.	*st. c.*,	Stone-canal.
nerv. circ.,	Nerve-ring.	*stom.*	Stomach.
nerv. rad.,	Radial nerve.		

PLATE I.

FIG. 1.—*Auricularia antarctica* viewed from the ventral aspect. Magnification 25 diameters. *coe.*, the spherical coelomic vesicle.

FIG. 2.—Some of the calcareous wheels of *A. antarctica*. Magnification 200 diameters. *a.*, seen from the convex side, *b.*, *c.*, and *d.*, from the concave side.

FIG. 3.—One of the youngest of the Holothurioids in the collection, viewed from the side. Magnification 60 diameters.

FIG. 4.—A young Cucumarian, presumably *C. lactea*, dredged at Plymouth in 1905. Magnification 110 diameters. A key is given to this plate.

PLATE II.

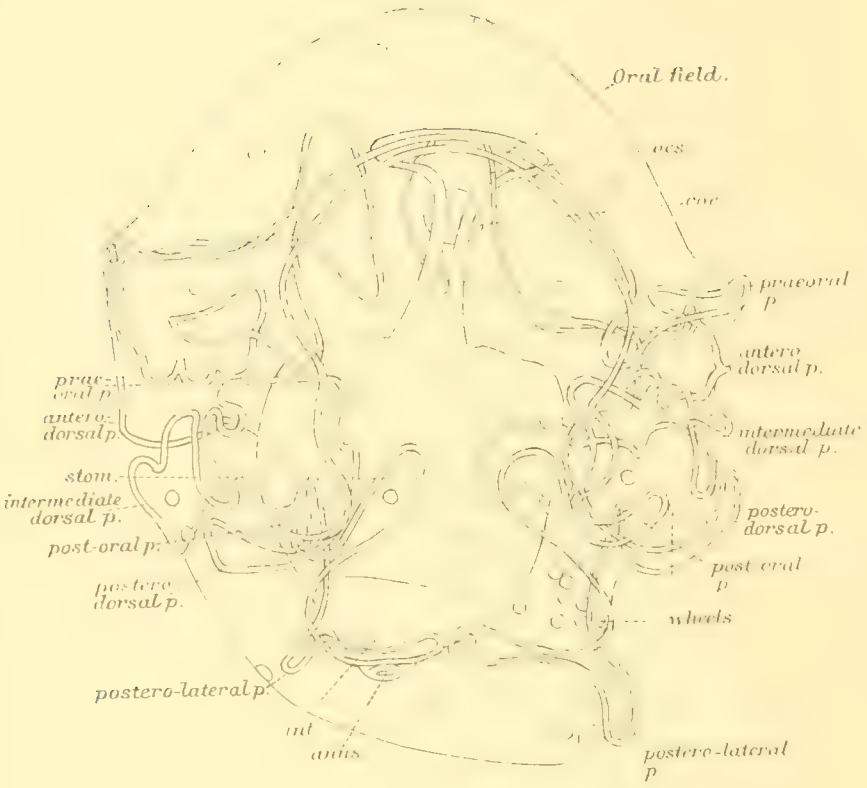
FIG. 5.—A median longitudinal section through one of the youngest Holothurioids in the collection. Magnification about 60 diameters. The intestine is seen to be perfectly straight and very short, and the stone canal (*st. c.*) opens into a closed vesicle (*ax.*).

FIG. 6.—A somewhat lateral longitudinal section through an older specimen than that represented in Fig. 5. Magnification 75 diameters. The axial sinus is seen to communicate with the cœlom by a canal (*mad.*).

FIG. 7.—A median longitudinal section through a specimen about the same age as that represented in Fig. 6. Magnification 75 diameters. *pul.*, a diverticulum of the thin-walled rectum, which is in all probability the rudiment of the pulmonary trees.

FIG. 8, *a.*, *b.*, and *c.*—Three transverse sections through one of the younger specimens. Magnification 75 diameters. 8*a.* is through the tentacles; 8*b.* through the middle region of the body, and 8*c.* through the posterior end; *g.?* curiously deeply-staining packets of cells resembling rudimentary gonads.

The restriction of the tube-feet to the three ventral interradii is seen, as also the fact that the most terminal tube-feet belong to the mid-ventral radius.



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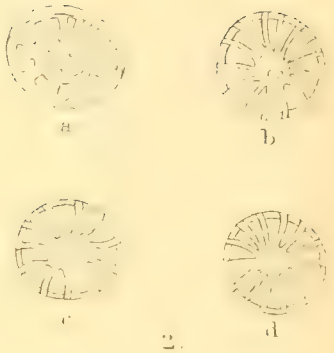

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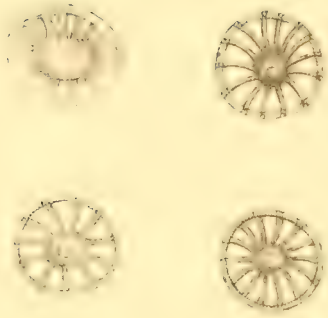
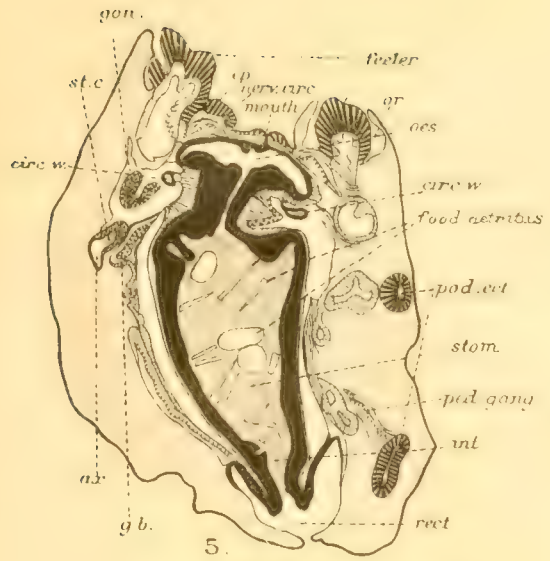
Antarctic (Discovery) Exp. Young Holothurioids, pl. I. (Key.) Aut. del. Huth, lith et imp

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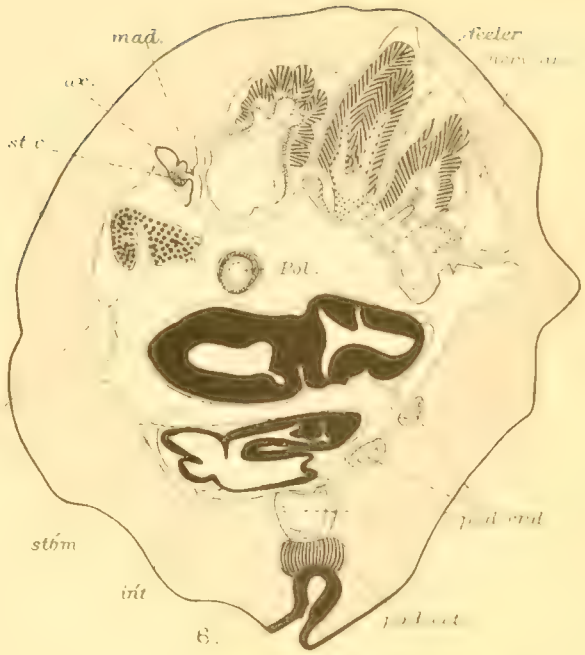
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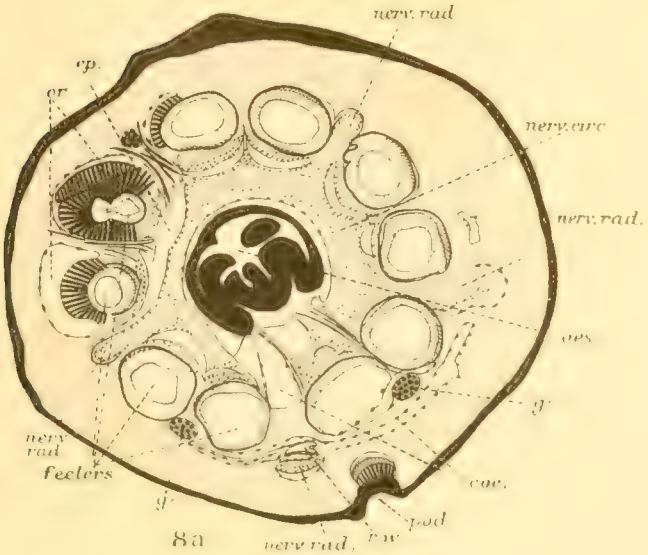
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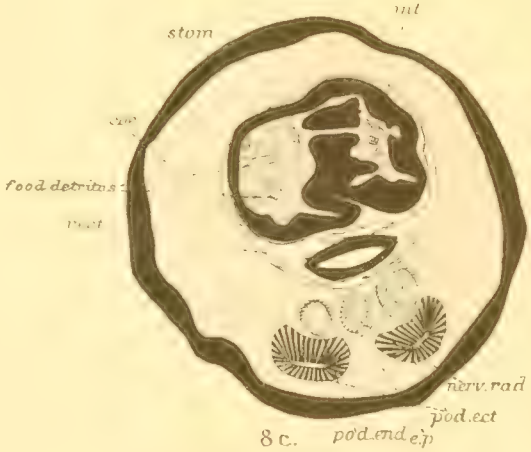
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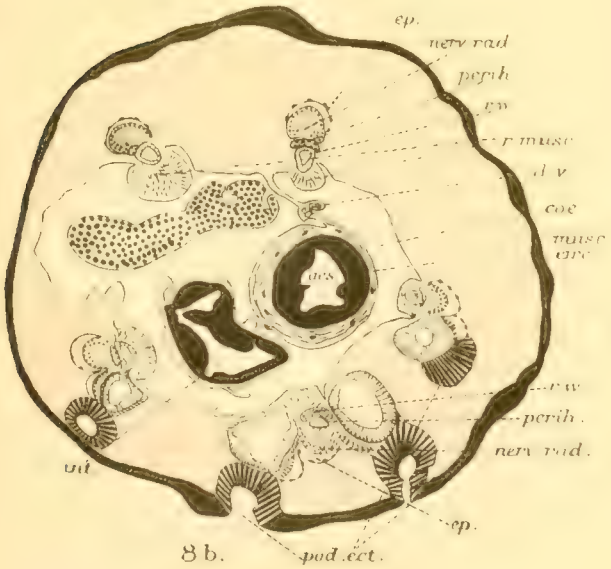
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POLYCHÆTA.

Von E. Ehlers,

Professor in Göttingen.

(3 Plates.)

VORWORT.

Die auf den folgenden Blättern aufgezählten polychæten Anneliden gehören zu der Sammlung, die auf der englischen antarctischen Expedition der 'Discovery' in den Jahren 1901–1904 gemacht wurde. Sie wurden mir zur Bearbeitung übergeben, als ich es unternommen hatte, die Anneliden, die auf der deutschen Südpolar- ('Gauss-') Expedition gesammelt waren, zu untersuchen. Diese sehr umfangreiche Sammlung hat mich lang beschäftigt. Ich hielt es für angemessen, die aus der 'Discovery'-Expedition stammenden Würmer gleichzeitig zu bearbeiten. Die Bearbeitung beider Sammlungen ist nun soweit abgeschlossen, dass die Ergebnisse zu übersehen sind. Ich bin dadurch in die Lage versetzt, diese, soweit sie sich auf die Thiere des antarctischen Kreises beziehen, mit einander zu vergleichen, und um Wiederholungen zu vermeiden, in der folgenden Darstellung auf die Ergebnisse der deutschen Südpolar-Expedition hier schon Rücksicht zu nehmen. Das geschieht mit der Notiz "Deutsche Südpolar-Expedition."*

* It has not been thought necessary to postpone the publication of this Memoir till after the production of Prof. Ehler's report, which may not be published till next year, in one of the volumes of the "Deutsche Südpolar-Expedition 1901–3."—F. J. B. (25. i. '12).

I. THEIL.

Zusammenstellung.

Die ganze Sammlung enthält 46 Arten von Polychæten, die sich auf 38 Gattungen und 20 Familien vertheilen. Von diesen sind 11 Arten bis jetzt unbeschrieben, 6 davon werden in den Ergebnissen der Deutschen Südpolar-Expedition beschrieben, 5 davon gehören der Sammlung der ‘ Discovery ’ an.

Im Folgenden gebe ich das Verzeichnis der gefundenen Polychæten.

Aphroditidæ.

Harmothoe spinosa Kbg.
Harmothoe crosetensis McInt.
Harmothoe tuberosa sp. n.
Hermadion magalhaensis Kbg.
Enipo rhombigera Ehl.

Phyllodocidæ.

Eulalia magalhaensis Kbg.
Eteone sp. Larve.
“ Phyllodociden ” Larve.
Pelagobia longicirrata R. Greeff.
Maupasia cæca Vig.

Hesionidæ.

Gyptis incompta sp. n.
Podarke comata sp. n.
Magalia inermis sp. n.

Alciopidæ.

Alciope cari Her.

Syllidæ.

Trypanosyllis gigantea McInt.
Syllis brachycola Ehl.
Pionosyllis comosa Grav.
Pionosyllis stylifera sp. n.
Eusyllis kerguelensis McInt.
Syllides articulosus Ehl.
Syllides sp. ?
Autolytus maclearanus McInt.
Autolytus longstaffi sp. n.

Lycoridæ.

Nereis vallata Gr.

Eunicidæ.

Marphysa aenea Blanch.

Glyceridæ.

Glycera capitata Örd.

Spionidæ.

Nerinopsis hystricosa sp. n.
Polytroche Spioniden Larve.

Ariciidæ.

Aricia marginata Ehl.

Opheliidæ.

Travisia kerguelensis McInt.
Ammotrypane gymnopyge Ehl.

Typhloscolecidæ.

Sagittella lobifera sp. n.
Sagittella cornuta sp. n.

Telethusæ.

Arenicola assimilis Ehl. var. affinis Ashw.

Chloræmidæ.

Flabelligera mundata Grav.
Trophonia kerguelarum Gr.

Scalibregmidæ.

Eumenia oculata Ehl.

Maldanidæ.

Maldanella neo-zealandica McInt.

Ampharetidæ.

Sabellides elongatus sp. n.

Terebellidæ.

Nicolea bilobata (Gr.).
Nicolea chilensis Schm.

Sabellidæ.

Laonome antarctica Kbg.
Myxicola sulcata sp. n.

Serpulidæ.

Serpula vermicularis L. var. narconensis Bd.
Spirorbis perrieri Caull. et Mesn.

Die weitaus grösste Anzahl der gefundenen Polychæten stammt, entsprechend der längeren Zeitdauer der Sammelthätigkeit, aus dem antarctischen Kreis mit dem Mittelpunkt des Winterquartiers der 'Discovery,' und von der Küste des South Victoria Landes und der vorliegenden Inseln. Hierzu kommen einige Funde von der Küste der Auckland Inseln und der daneben liegenden Shoe Insel, sowie solche, die auf der Fahrt gemacht wurden.

Nach den Fundortangaben, die bei den gesammelten Thieren lagen, gebe ich folgende Zusammenstellung. Die Bezeichnungen No. 1 hole–13 hole gehen Öffnungen an, die in das Eis geschlagen waren und aus denen gefischt wurde; die Dauer der Befischung mit dem Schleppnetz und die Beschaffenheit des Grundes ist daneben angegeben.

Winter Quarters.

Harmothoe spinosa Kbg., 27. i. 02, 300 fms.*; 29. i. 02; 26. ii. 02; 8. iii. 02; 18. iii. 02, 10 fms.; 21. iii. 02; 28. iii. 02, 10 fms.; 5. vi. 02; 15. vi. 02, D. net; 7. viii. 02, 175 fms.; 22. ii. 03, 10 fms.

Harmothoe crosetensis McInt., 27. i. 02, 300 fms.; 13. ii. 02, 178 fms.; 1. v. 02.

Harmothoe tuberosa sp. n., 27. i. 02, 300 fms.; 8. iii. 02; 21. iii. 02, 10 fms.; 15. vi. 02, D. net.

Hermadion magalhaensis Kbg., 27. i. 02, 300 fms.; 28. ii. 02, 20 fms.

Enipo rhombigera Ehl., 21. i. 02, 300 fms.; 29. i. 02; 7. viii. 02, 178 fms.; 1. ii. 03.

Phyllodociden Larve, 19. ii. 02.

Podarke comata Ehl., 20. ii. 02.

Syllis brachycola Ehl., 19. iii. 02, 10 fms.

Pionosyllis comosa Grav., 20. ii. 02, 10 fms.; 23. vi. 02.

Pionosyllis stylifera Ehl., 20. ii. 02; 22. iii. 02, 10 fms.

Syllides articulosus Ehl., 19. iii. 02.

Autolytus maclearanus McInt., 19. ii. 02; 19. iii. 02, 10 fms.; 22. iii. 02, 10 fms.

Nerinopsis hystricosa, 13. vii. 03, 10 fms.

"*Polytroche Spioniden* Larve," 19. ii. 02.

Aricia marginata Ehl., 13. vi. 02.

* Prof. Ehlers has, as others, translated "fathoms" by "Faden"; I have enquired of the Naval Attaché to the German Embassy in London, who tells me that in the "Handbook of Navigation" a "Faden" is said to be equal to 1·88 meters, and a "fathom" to 1·829. When multiplied by 100 the difference between the two is considerable.—F. J. B.

Ammotrypane gymnopyge Ehl., 5. vi. 02, D. net.
Flabelligera mundata Grav., 21. iii. 02, 10 fms.
Trophonia kerguelarum Gr., 27. i. 02, 300 fms.
Nicolea bilobata Gr., 20. ii. 02; 28. ii. 02, 107 fms.; 19. iii. 02, 10 fms.; 13. ii. 04.
Laonome antarctica Kbg., 27. i. 03.
Serpula vermicularis L. var. *narconensis* Bd., 29. i. 02, 100 fms.; 8. ii. 02, 100 fms.

No. 2 *hole.*

150 yards S. of Ship. 10 fms. Stones and Gravel. 10. iv. 02 to 29. iv. 02.

Harmothoe tuberosa, 28. iv. 02.
Pelagobia longicirrata R. Gr., 1. vii. 02, 4 fms.; 1. viii. 02; 13. viii. 03, 10 fms.
Nerinopsis hystricosa sp. n., 1. vii. 02, 4 fms.; 1. viii. 02, D. net.

No. 3 *hole.*

Half mile S. of Ship. 56 fms. Stones and Gravel. 23. iv. 02 to 11. vi. 02.

Maupasia cæca Vig., 11. vi. 02, 5 fms.
Nerinopsis hystricosa sp. n., 11. vi. 02, 5 fms.

No. 4 *hole.*

Half mile S. of Hut Point. 41 fms. Stones. 1. xi. 02 to 19. vi. 03.

Pelagobia longicirrata R. Gr. 14–25 ii. 02, 5–6 fms.; 16. v. 02, 5 fms.; 25. xii. 02, 6 fms.; 16. ii. 03, 5 fms.; 24. ii. 03, 5 fms.; 21. iii. 03, 6 fms.; 23. iii. 03, 6 fms.; 29. iv. 03, 5 fms.; 6. v. 03, 5 fms.; 9. v. 03, 5 fms., 8 fms.; 29. v. 03, 5 fms.; 18. ix. 03, 10 fms.
Maupasia cæca Vig., 25. v. 03, 5 fms.
Autolytus longstaffi sp. n., 18. ix. 03, 10 fms.
Nerinopsis hystricosa sp. n., 9. v. 03, 5 fms., 8 fms.; 29. v. 03, 5 fms.; 18. ix. 03, 8 fms.
"*Polytroche Spioniden* Larve," 16. ii. 03, 5 fms.; 18. iv. 03, 10 fms.
Eumenia oculata Ehl., 14. xii. 02, 6 fms.

No. 5 *hole.*

Seal hole. 1½ miles W. of Hut Point. 178 fms. 1. viii. 02–7. viii. 02.

Trypanosyllis gigantea McInt. 12. iii. 03, 10 fms.
Nicolea bilobata Gr., 14. i. 03.

No. 6 *hole.*

1½ miles N.W. of Hut Point. 125 fms. Stony ground. 27. xii. 02 to 8. iv. 03.

Harmothoe spinosa, 10. i. 03, 180 fms.; March, 1903; 10. iii. 03, 13 fms.
Pelagobia longicirrata R. Gr., 26. ii. 03, 6 fms.; 12. iii. 03, 5 fms.; 6. v. 03, Plankton.
Nicolea bilobata Gr., 4. iii. 03, 30 fms.
Laonome antarctica Kbg., 4. iii. 03, 130 fms.; 13. vi. 02, 100 fms.
Serpula vermicularis L. var. *narconensis* Bd., 15. ii. 02.

No. 8 *hole.*

30 yards S. of Hut Point. 8. ii. 04.

Pelagobia longicirrata R. Gr., 5. v. 03, 10 fms.; 18. v. 03, 10 fms.; 26. v. 03, 10 fms.; 1. vi. 03, 10 fms.; 28. vi. 03, 10 fms.; 24. vii. 03, 10 fms.; 1. viii. 03, 10 fms.; 21. viii. 03, 10 fms.; 27. viii. 03, 10 fms.
Maupasia cæca Vig., 28. vi. 03.
Gyptis incompta Ehl., 16 vi. 03, 10 fms.; ix. 03, Grund, 200 fms.
Trypanosyllis gigantea McInt., 23 iii. 03, 10 fms.
Syllides sp.?, 13. viii. 03, 10 fms.
Nerinopsis hystricosa sp. n., 28. vi. 03; 24. vii. 03, 10 fms.; 13. viii. 03, 10 fms.
Serpula vermicularis L. var. *narconensis* Bd., 1. iv. 03, 10 fms.

No. 9 *hole.*

Half way between No. 6 and Flagon Point. 51 fms. 16. iii. 03 to 1. iv. 03.

Pelagobia longicirrata R. Gr., 2. x. 02, 10 fms.

No. 10 *hole.*

$1\frac{1}{2}$ miles S. of Ship. 127 fms. On the edge of a bank. Bottom, small stones and organic débris. 14. iv. 03 to 14. viii. 03.

Harmothoe spinosa Kbg., 22. iv. 03, 127 fms.; 3. vi. 03, 130 fms.
Harmothoe crosetensis McInt., 4. v. 03, 130 fms.
Trypanosyllis gigantea (McInt.), 18. vi. 03, 130 fms.
Eusyllis kerguelensis McInt., 3. vi. 03, 130 fms.
Nicolea bilobata Gr., 18. vi. 03, 130 fms.
Laonome antarctica Kbg., 18. vi. 03, 130 fms.
Myxicola sulcata sp. n., 18. vi. 03, 130 fms.

No. 12 *hole.*

100 yards S. of Hut Point. 25–30 fms. D. net. 20. viii. 03 to 5. xi. 03.

Harmothoe spinosa Kbg., 20. viii. 03; 29. viii. 03; 4. ix. 03, D. net; 8. ix. 03, D. net; 25–30. ix. 03, D. net.
Enipo rhombigera Ehl., 29. viii. 03, D. net; 8. ix. 03, D. net.
Pelagobia longicirrata R. Gr., 21. x. 03, 10 fms.; 2. xi. 03, 10 fms.; 5. xi. 03, 6 fms.
Gyptis incompta sp. n., 8. ix. 03, D. net.
Magalia inermis sp. n., 2. x. 02, 10 fms.
Autolytus macleavanus McInt., 25–30. ix. 03, D. net.
Glycera capitata Ord., 4. ix. 03, D. net.
Nerinopsis hystricosa sp. n., 5. xi. 03, 6 fms.
Aricia marginata Ehl., 4. ix. 03, 257 fms.
Eumenia oculata Ehl., 4. ix. 03, 25 fms.
Nicolea bilobata Gr., 18. ix. 03, D. net.

No. 12 *hole* (2).—Hazen Point.

Serpula vermicularis L. var. *narconensis* Bd., 17. x. 03, 20 fms.

No. 13 *hole.*

20 yards N.E. of Hut Point. 7. xii. 03 to 27. i. 04.

Pelagobia longicirrata R. Gr., 4. i. 04, 6 fms.
Nerinopsis hystricosa sp. n., 15. xii. 03, 8 fms.

Mollendo Bay near W.Q.

Hermadion magalhaensis Kbg., 13. ii. 02, 10 fms.
Autolytus maclearanus McInt., 8. ii. 02, 96–120 fms.
Nicolea bilobata Gr., 28. ii. 02, 20 fms.

Hut Point.

Harmothoe spinosa Kbg., 13. ii. 02, D. net; 13. ix. 02, D. net; 24. ix. 02; 18. x. 02, D. net; 25. x. 02; 30. x. 02; 11. xi. 02; 13. xi. 02; 19. xi. 02; 15. xii. 02, D. net; 24. viii. 03, D. net.
Gyptis incompta sp. n., 25. x. 02, D. net; 15. xii. 02, D. net.
Trypanosyllis gigantea McInt., 300 yards S. Hut Pt., 8. ii. 03.
Nicolea bilobata, Gr., 18. x. 02; 13. ii. 04, D. net.

West Point.

Hermadion magalhaensis Kbg., 18. x. 02.

Flagon Point.

Harmothoe spinosa Kbg., 17. i. 03, 102 fms.; 23. i. 03, 20 fms.; 23. ii. 03.

Glacier Hole.

Enipo rhombigera Ehl., 2. i. 04, 180 fms.
Laonome antarctica Kbg., 2. i. 04, 180 fms.

Off Cape Armitage.

Laonome antarctica Kbg., 13. ix. 02, 100 fms.
Serpula vermicularis L. var. *narconensis* Bd., 13. ix. 02, 100 fms.

McMurdo Bay.

Harmothoe spinosa Kbg., 8. ii. 02, 96–120 fms.; 13. ii. 02, 107 fms.; 28. ii. 02, 20 fms.
Enipo rhombigera Ehl., 8. ii. 02, 96–120 fms.
Pionosyllis stylifera sp. n., 28. ii. 02, 20 fms.

Erebus and Terror.

Sabellides elongatus sp. n., 21. i. 02, 500 fms.

Coulman Island.

Harmothoe spinosa Kbg., 13. i. 02, 100 fms.; 15. i. 02, 15–18 fms.
Enipo rhombigera Ehl., 13. i. 02, 100 fms.
Eulalia magalhaensis Kbg., 13. i. 02, 100 fms.
Pelagobia longicirrata R. Gr., 22. ii. 04, 13–20 fms.
Trypanosyllis gigantea McInt., 13. i. 02.
Glycera capitata Örd., 4. ix. 03, D. net.
Flabelligera mundata Grav., 13. i. 02.
Serpula vermicularis L. var. *narconensis* Bd., 13. i. 02, 100 fms.

Cape Adare.

Harmothoe spinosa Kbg., 9. i. 02, 20 fms.; 24. ii. 04.
Eusyllis kerguelensis (McInt.), 9. i. 02, 20 fms.
Travisia kerguelensis McInt., Laminarian root, 12. ii. 04, 17–20 fms.
Spirorbis perrieri M. Caullery & F. Mesn., 24. ii. 04, 13–20 fms.

Von diesen Arten sind zur Zeit die folgenden nur als antarctische bekannt :—

Enipo rhombigera Ehl.
Gyptis incompta sp. n.
Podarke comata sp. n.
Magalia inermis, sp. n.
Pionosyllis comosa Grav.
Pionosyllis stylifera sp. n.
Autolytus longstaffi, sp. n.
Flabelligera mundata Grav.
Sabellides elongatus sp. n.
Myxicola sulcata, sp. n.

Die übrigen Arten sind auch notial oder atlanto-pacifisch; darunter hat *Pelagobia longisetosa* R. Gr. pelagisch eine sehr weite Verbreitung und ist *Glycera capitata* Örd. vielleicht bipolar.

Auf der Fahrt gesammelt.

Lat. 41° 10′ *S.*, *Long.* 178° 18′ 30″ *W.*

Eteone, sp. Larve.

Lat. 49° 40′ *S.*, *Long.* 172° 18′ 15″ *W.*

Sagittella cornuta sp. n.

Lat. 54° 01′ *S.*, *Long.* 170° 49′ *E.*

Pelagobia longicirrata R. Gr., 27. x. 01.
Polytroche Spioniden Larve, 27. xii. 01.

Lat. 66° 52′ *S.*, *Long.* 178° 15′ *E.*

Sagittella lobifera sp. n., 3. i. 02.

Lat. 66° 53′ *S.*, *Long.* 178° 15′ *E.*

Alciope cari Her., 3. i. 02.

Auckland Island, Will Point, Laurie Harbour.

Nereis vallata Gr., 25. iii. 04.
Marphysa aenea Blanch., 25. iii. 04.
Arenicola assimilis Ehl. var. *affinis* Ashw., 28. iii. 04.
Maldanella neo-zealandica McInt., 25. iii. 04.
Nicolea chilensis Schm., Shore, 16. v. 04.

Shoe Island.

Nereis vallata Gr., 23. iii. 04.

Alle diese Arten haben mehr oder minder weite indo-pacifische Verbreitung.

II. THEIL.

Systematisches.

APHRODITIDÆ.

Harmothoe spinosa Kbg.

Synonymie: Ehlers, Polychaeten d. Magell. u. Chilen. Strandes, Festschr. Ges. Göttingen (1901), p. 41.

Von den mannigfaltigen Farbenvarietäten, unter denen diese im antarctischen Kreise weit verbreitete Form auftritt, hebe ich einige besonders auffallende, nur selten beobachtete Formen hervor. So das auf Pl. I., fig. 8 abgebildete Thier, das nach dem Besitz der bläschenartigen randständigen Warzen an den Elytren in die *Vesiculosa*-Gruppe gehört: die braunvioletten Elytren sind hier über der Anheftungstelle mit einem hellfarbigen runden Fleck gezeichnet. Ein anderes Thier trug unter den Elytren auf der Rückenfläche eine auffallende Zeichnung von queren Binden, ähnlich jener, die bei *Enipo rhombigera* Ehl. sich findet; da das Thier vom gleichen Fundort wie diese Art stammt, könnte man an eine Art von Mimicry denken. Die auch sonst beobachtete Bildung, dass sich auf der Rückenfläche des Elytron über der Anheftungstelle eine einzelne grosse keulenförmige Papille erhebt, ist einmal von mir beobachtet (W.Q.; 15. xii. 02; D. net; Hut Pt.).

Von Cap Adare aus 20 fms. Tiefe stammt ein junges 10 mm. langes Thier mit 31 Segmenten, bei dem auf dem Kopflappen hinter dem unpaaren Fühler eine mediane Leiste stand; ich muss unentschieden lassen, ob das mehr bedeutet als eine Variation.

Fundorte.—W.Q., 27. 1. 02, 300 fms.; 29. 1. 02; 26. ii. 02; 8. iii. 02*; 18. iii. 02, 10 fms.; 21. iii. 02; 28. iii. 02, 10 fms.; 5. vi. 02; 15. vi. 02; 7. viii. 02, 178 fms.; 22. ii. 03, 10 fms. — No. 6 hole, 10. i. 03, 180 fms.; March 1903; 10. iii. 03, 13 fms. — No. 10 hole, 22. iv. 03, 127 fms.; 3. vi. 03, 130 fms. — No. 12 hole, 20. viii. 03, D. net; 29. viii. 03; 8. ix. 03, D. net; 25–30. ix. 03, D. net. — Hut Point, 13. ii. 02, D. net; 13. ix. 02, D. net; 24. ix. 02; 18. x. 02, D. net; 25. x. 02, D. net; 30. x. 02, D. net; 11. xi. 02; 13. xi. 02; 19. xi. 02; 15. xii. 02, D. net; 24. viii. 03. — Cape Adare, 9. i. 02, 20 fms.; 24. ii. 04. — Coulman Isl., 13. i. 02, 100 fms.; 15. i 02, 15–18 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land, Süd-Georgien, Falkland Insel, Magellangebiet, Kerguelen, Neu Seeland (Ehlers).

Harmothoe crosetensis (McInt.).

Lagisca crosetensis, McIntosh, Report 'Challenger,' Zool., vol. xii. (1885), p. 88.

Von dieser Art habe ich eine ausführliche Darstellung in der Bearbeitung der Anneliden-Sammlung der Deutschen Südpolar-Expedition gegeben, in der sie gut vertreten war.

Fundort.—W.Q., 27. i. 02, 300 fms.; 13. ii. 02, 178 fms.; 1. v. 02; 1. viii. 02. — No. 10 hole, 4. v. 03, 130 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers). In der Nähe der Crozet Insel (McIntosh).

Harmothoe tuberosa, sp. n.

Nachdem ich von der *Harmothoe spinosa* Kbg. eine grössere Reihe von Varietäten kennen gelernt habe, muss ich die früher * von mir vermuthungsweise gleichfalls als eine Varietät dieser Art angesprochene Polynoine von der Bouvet-Insel doch von dieser als gesonderte Art auffassen, da ich keine Übergangsformen zu der so sehr variabelen *Harmothoe spinosa* Kbg. gefunden habe. Der folgenden Beschreibung liegt ein einzelnes Stück zu Grunde.

Der zwischen Kopflappen und Aftersegment 35 Segmenten führende, auf der Bauchfläche platte, auf der Rückenfläche wenig gewölbte Körper ist 47 mm. lang, hat seine grösste Breite (13 mm.) zwischen dem 4ten und 6ten Elytron und ist nach vorn und hinten wenig verschmälert. Die Rückenfläche ist völlig von den imbricat-decussaten bräunlich-grauen Elytren gedeckt, über die an den Seiten die braunen Borsten wenig hervorragen (Pl. I., fig. 1).

Der Kopflappen (Pl. I., fig. 2), ist eine mässig gewölbte farblose Platte, die etwa so lang als in der hinteren Hälfte breit ist, nach hinten wenig, nach vorn fast um die Hälfte verschmälert und hier median tief eingefurcht. Zwei kleine punktförmige schwarze Augen stehen nahe vor dem Hinterrande, jedes etwa gleich weit von der Mittellinie wie vom Seitenrande entfernt. Ein zweites grösseres Auge, von oben nicht sichtbar, steht unmittelbar hinter dem Ursprung der paarigen Fühler. Am Vorderrande entspringt in dessen medianem Einschnitt mit einem grossen kegelförmigen Wurzelgliede, das die Länge des Kopflappens übertrifft, der lange unpaare schlank kegelförmige mit feinem Endfaden auslaufende Fühler, der mit Ausnahme des Endfadens von Papillen zottig rauh ist. Unmittelbar neben ihm stehen die sehr viel kleineren, wenig über das Wurzelglied des unpaaren hinausreichenden, mit Ausnahme der Spitze gleichfalls rauhen paarigen Fühler. Zwei glatte schlank kegelförmige Palpen kommen von der Unterseite des Kopflappens und reichen nach vorn gelegt weiter als der unpaare Fühler.

Das erste Segment ist erheblich kürzer als die folgenden; diese sind mit Rudern etwa siebenmal, ohne Ruder nicht ganz fünfmal breiter als lang. Ihre Rückenfläche ist unter den Elytren in auffallender Weise durch eine mediane Reihe von Höckern ausgezeichnet (Pl. I., fig. 2). Am ersten Segment ist dieser Höcker ein kleiner nach vorn auf dem Kopflappen liegender bräunlicher Lappen; auf den folgenden Segmenten verbreitert sich der Höcker zu einem queren Wulst mit stärker vorspringenden nach

* Ehlers, Bodensässige Anneliden . . . Deutsch. Tiefsee-Expedition (Wiss. Ergebn. deutsch. Tiefsee-Exp., xvi., 1908), p. 43.

hinten gerichteten Ecken ; in der hinteren Körperstrecke zieht sich die Bildung wieder zu einem unpaaren medianen Höcker zusammen (Pl. I., fig. 3). Ein Alterniren habe ich hierbei nicht gesehen, wohl aber einmal auf einem Segmente den Ausfall eines solchen Höckers. Dass diese Bildung variiert, zeigte ein Exemplar aus 300 fms. Tiefe (27. i. 02), bei dem diese Höcker nur auf den vorderen sechs Segmenten vorhanden waren.

Das erste Segment trägt jederseits zwei lange zottige Fühlercirren mit nackter Endspitze auf dicht zusammen stehenden Wurzelgliedern ; sie reichen nach vorn fast so weit als die Palpen ; Borsten habe ich zwischen den Wurzelgliedern nicht gesehen.

An den folgenden Segmenten tragen die Ruder in typisch alternirender Weise (1. 3. 4. 6. . . . 24. 27. 30.) 13 Paare Elytren und Rückencirren. Das Ruder (Pl. I., fig. 4) hat einen kürzeren dorsalen und längeren ventralen Ast ; der dorsale erscheint als ein aufwärts gerichtete Fortsatz auf der Wurzel des seitwärts gewendeten ventralen Astes ; ersterer hat eine kurze fingerförmige, letzterer eine breitere lappenförmige Lippe. Die dunkelbraunen Borsten des dorsalen Astes treten in einem gebogenen stark gespreizten Fächer aus, ihr schwach säbelförmig gebogener, fast gleich breiter quer gerippter Schaft läuft bei den meisten mit einem dichten Büschel kurzer Fäden aus, die detritusartige Massen tragen ; ich mag nicht entscheiden, ob diese Fäden durch Aufsplitterung des Borstenendes entstanden oder epiphytische Bildungen sind ; andere laufen, mit kurzer heller Spitze aus, neben der aber ähnliche Härchen stehen (Pl. I., fig. 7a).

Die etwas helleren ventralen Borsten (Pl. I., fig. 7b) bilden ein zusammenliegendes Bündel ; die einzelne Borste läuft von einer kurzen, rasch verbreiterten Endstrecke spitz aus ; auf dieser Endstrecke stehen wenige (5–6) Randzähne ; die schlanke Endspitze ist einfach. Der lange Rückencirrus sitzt auf einem grossen kegelförmigen an der hinteren Fläche der Ruderbasis stehenden Cirrophor ; sein Schaft ist rauh von fadenförmigen Papillen, die fadenförmige Endstrecke nackt. Lateral von ihm steht, in der Höhe der Elytrophoren ein grosser kegelförmige Elytrenhöcker. Die derben festhaftenden Elytren sind mit Ausnahme der ersten kleineren kreisförmigen am medianen Rande nierenförmig ausgerandet, mit excentrischer der Ausrandung genäherter Anheftung ; die untere Fläche ist farblos, irisirend, die obere bräunliche mit hellen zerstreuten kreisförmigen Flecken besetzte Fläche trägt auf dem freien Theile neben vereinzelten fadenförmigen harte gegen den Rand hin an Zahl und Grösse zunehmende feste Knöpfe oder kolbenförmige auf der Kuppe morgensternartig stachelige Papillen. Der Elytrenrand ist daneben mit gröberen und feineren langen fadenförmigen Papillen gefranst. Der am unteren Umfang des ventralen Parapodialastes sitzende schlank kegelförmige Bauchcirrus ist am ersten Ruder viel länger als an den folgenden und reicht über die Borstenbündel hinaus, an den folgenden Rudern erreicht er kaum die Spitze des ventralen Astes. An fast allen Rudern stehen kleine Genitalpapillen.

Das kurze Aftersegment trägt zwei wie die Rückencirren gestaltete Aftercirren.

Fundort.—W. Q. 27. i. 02, 300 fms. ; 8. iii. 02 ; 21. iii. 02, 10 fms. ; 1. v. 02. — No. 2 hole, 28. iv. 02.

Weitere Verbreitung.—Bouvet Ins. (Ehlers).

Sieht man von der Bildung der medianen dorsalen Höcker ab, so liegt m. E. kein Grund vor, diese Art aus der Gattung Harmothoe auszuschliessen. Über den taxonomischen Werth dieser Höcker wird erst zu urtheilen sein, wenn ihr Bau und danach ihre Bedeutung erkannt ist. Da solche und ähnliche Höcker an anderen Aphroditiden vorkommen, wie bei *Hemilepidia tuberculata* Schm., *Polynoe scolopendrina* (Sav.), *Enipo kinbergi* Mlmg., die nähere Verwandtschaft nicht besitzen, so ist ihre Verwendung als Gattungscharacter zweifelhaft. Offenbar gehört der bei manchen Polynoinen auftretende unpaare, ungleich gestaltete Nackenhöcker in die Reihe dieser Bildungen hinein; seine Form wird dann für Artunterscheidungen zu verwerthen sein. Diese Bildung tritt in der *Lepidonotus*- wie in der *Harmothoe*-Gruppe auf.

Hermadion magalhaensis Kbg.

Synonymie: Ehlers, Polychaeten des magell. u. chilen. Strandes, Festschr. Ges. Göttingen (1901), p. 43.

Fundort.—W.Q., 27. i. 02, 300 fms.; 28. ii. 02, 20 fms. — West Point, 18. x. 02. Mollendo Bai, 13. ii. 02, 10 fms.

Weitere Verbreitung.—Kerguelen, Falkland Inseln, Magellangebiet.

Enipo rhombigera Ehl.

Ehlers, Bodensässige Anneliden d. deutsch. Tiefsee-Expedition, xvi. (1908), p. 47, pl. IV., fig. 1–12.

Diese bislang von der Bouvet Insel und aus dem Winterquartier der deutschen Südpolar-Expedition bekannte Art erweist sich nach den unten verzeichneten Fundstätten der 'Discovery'-Expedition als ein im antarctischen Kreise weit verbreitetes Thier. Der Wurm ist hier nach den beigelegten Notizen auf Sertulariiden gefunden, und als daran parasitisch lebend bezeichnet.

Fundort.—W.Q., 21. i. 02, 300 fms.; 29. i. 02; 7. viii. 02, 178 fms.; 1. ii. 03. No. 12 hole, 29. viii. 03, D. net; 8. ix. 03, D. net. — Coulman Isl., 13. 1. 02, 100 fms. — McMurdo Bai, 8. ii. 02, 96–120 fms. — Glacier Hole, 2. i. 04, 180 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers).

PHYLLODOCIDÆ.

Eulalia magalhaensis Kbg.

Kinberg, Annulata nova, Öfvers. k. Vet. Ak. Forh. (1865), p. 241; id. Freg. Eugenies Resa, Zool., vii. (1910), p. 55, pl. XXIII., fig. 1.

Fundort.—Coulman Is., 13. i. 02.

Weitere Verbreitung.—Bai Biscoe (Gravier), Magellan- und Feuerländischer Bezirk (Ehlers), Ins. Bucket (Kinberg).

Eteone sp. Larve.

Kleine bräunliche Thiere, bei 3 mm. Länge 23 Segmente mit unfertiger kurzer präanaler Strecke, bei 4 mm. Länge mit 30 Segmenten, die präanalen mit Rudern. Bei beiden ein analer Wimperkranz. Segmente stark zweiringelig. Kopflappen mit sehr kleinen Anhängen, die beiden ersten Segmente mit viel kleineren Rudern als die folgenden. Diese Ruder von der Form, wie sie der Gattung Eteone zukommt.

Eine genauere Artbezeichnung scheint mir ausgeschlossen; ich erwähne die Thiere als Beleg dafür, dass solche noch pelagisch vorkommen.

Fundort.—Lat. 41° 10′ S., Long. 78° 18′ 30″ W.

"Phyllodociden"-Larve.

Eine *Phyllodociden*-Larve, deren nähere Bestimmung zur Zeit ausgeschlossen ist.

Fundort.—W.Q., 19. ii. 02.

Pelagobia longicirrata R. Greeff.

R. Greeff, Über pelagische Anneliden . . . Zeitschr. f. w. Zool., xxvii. (1879), p. 237.

I. Reibisch, Die pelagischen Phyllodociden und Typhloscoleciden der Plankton-Expedition. Ergebnisse d. Plankton-Exped., Bd. ii., H. c. (1895), p. 21, pl. II., figs. 1–9.

Pelagobia longicirrata R. Gr. ist, wie die Zusammenstellung der Fundstätten zeigt, im Sammelgebiet der 'Discovery'-Expedition sehr häufig, in ähnlicher Weise wie in der Ausbeute der Deutschen Südpolar-Expedition an Kaiser Wilhelm II Land. Für die sehr weite Verbreitung dieses pelagischen Wurmes ist das sehr characteristisch. Gesammelt sind die Thiere in allen Monaten des Jahres mit Ausnahme von April und September; das Fehlen hier mag Sache des Zufalls sein. Aus grösseren Tiefen ist hier die Art nicht gehoben; die Sammlung von Kaiser Wilhelm II Land tritt hier ergänzend ein und weist eine grössere Vertikalverbreitung nach. Für die Fortpflanzungsperiode ist der am 4. i. 04 in hole No. 13 auf 6 fathoms Tiefe gemachte Fang kennzeichnend, in dem neben erwachsenen Thieren zahlreiche Junge von etwa 2 mm. Länge gesammelt waren.

Fundorte.—W.Q., 13. i. 02; 17. ii. 02; 19. ii. 02; 26. ii. 02; 18. v. 03; 26. ii. 04. — No. 2 hole, 1. vii. 02, 4 fms.; 1. viii. 02; 13. viii. 03, 10. fms. — No. 4 hole, 14. und 25. ii. 02; 16. v. 02, 5 fms.; 25. xii. 02, 6 fms.; 16. ii. 03, 5 fms.; 24. ii. 03, 5 fms.; 21. iii. 03, 6 fms.; 23. iii. 03, 6 fms.; 6. v. 03, 5 fms.; 9. v. 03, 5 fms.; 29. v. 03, 5 fms. — No. 6 hole, 26. ii. 03, 6 fms.; 12. iii. 03, 5 fms.; 6. v. 03, Plankton. — No. 8 hole, 5. v. 03, 10 fms.; 18. v. 03, 10 fms.; 26. v. 03, 10 fms.; 1. vi. 03, 10 fms.; 23. vi. 03, 10 fms.; 24. vii. 03, 10 fms.; 21. viii. 03, 10 fms.; 27. viii. 03, 10 fms. — No. 9 hole, 2. x. 02, 10 fms. — No. 12 hole, 21. x. 03, 10 fms.; 2. xi. 03, 10 fms.; 5. xi. 03, 10 fms. — No. 13 hole, 4. i. 04, 6 fms. — Coulman Island, 22. ii. 04. — Lat. 54° 01′ S., 170° 49′ E., 27. x. 01.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers). Atlantisch und indisch, vielleicht kosmopolitisch (Reibisch).

Maupasia cæca Vig.

C. Viguier, Animaux inférieurs de la baie d'Alger, Arch. de Zool. expér., iv. (1886), p. 382, pl. XXI., fig. 14–20.

Wenige in Einzelfunden angetroffene Thiere ; ein grösstes war 5·5 mm. lang und hatte 19 borstentragende Segmente ; das Aftersegment fehlte. Die Bestimmung ist nicht ganz sicher.

Fundort.—W.Q., No. 3 hole, 5 fms., 11. vi. 02. — No. 4 hole, 5 fms., 28. v. 03 ; 29. v. 03. — No. 8 hole, 28. vi. 03.

Weitere Verbreitung.—Mittelmeer (Viguier, Lo Bianco) ; Sargasso See (Reibisch).

HESIONIDÆ.

Gyptis incompta Ehl.

Ehlers, Deutsche Südpolar-Expedition.

Bei einem weiblichen Thiere, das die Eier zum Theil abgelegt hatte und solche auf der Körperoberfläche angeklebt trug, fehlten die sonst vorhandenen dorsalen Borsten, wohl aber war die Stützнadel im Höcker neben dem Rückencirrus vorhanden.

Fundorte.—W.Q., No. 8 hole, 16. vi. 03, 10 fms. ; 8. ix. 03, Grund, 200 fms. — No. 12 hole, 8. ix. 03, D. net. — Hut Point, 25. x. 02, D. net ; 15. xii. 02, D. net.

Weitere Verbreitung.—Kaiser Wilhelm II Land.

Podarke comata Ehl.

Ehlers, Deutsche Südpolar-Expedition.

Fundort.—W.Q., 20. ii. 02.

Weitere Verbreitung.—Kaiser Wilhelm II Land.

Magalia Mar. et Bobr., char. em.

Marion et Bobretzky, Annélides du Golfe de Marseille, Ann. Sc. nat. Zoolog., ii. (1875), p. 54.

Magalia inermis sp. n.

Von dieser Art liegen wenige, mehr oder minder gut erhaltene Stücke vor. Nach dem best erhaltenen, einem mit Eiern gefüllten Weibchen gebe ich die Beschreibung, die ich nach Beobachtungen an anderen Thieren ergänze, so dass sie wohl allgemeine Gültigkeit hat.

Der einfarbige, bräunlich gelbliche Wurm ist 10 mm. lang und hat zwischen Kopflappen und Aftersegment 38 Segmente ; er ist fast grade gestreckt, dorsoventral abgeplattet, mit weit vorragenden Rudern, die grosse Borstenfächer tragen und, soweit sie vorhanden sind, mit langen Fühler- und Rückencirren (Pl. II., fig. 1).

Der Kopflappen (Pl. II., fig. 2) ist eine querovale Platte, die etwa um ein Drittel breiter als lang ist, mit gradem Vorder- und in der Mitte schwach eingeschnittenem Hinterrande, mit abgerundet vortretenden Seitenrändern. Auf

seiner hinteren Hälfte stehen vier rothbraune Augen im Trapez, die hinteren etwas näher bei einander als die vorderen, beide dem Seitenrande näher als der Mittellinie; die vorderen Augen nach vorn ausgerandet, vermuthlich für die Aufnahme einer — im Leben vorhandenen — Linse, die hinteren mit aufwärts gerichteter Pupille. An den Ecken des Vorderrandes steht jederseits ein spindelförmiger einfacher Fühler, etwa so lang als die halbe Länge des Kopflappens; darunter jederseits ein längerer, über ihn hinausreichender Unterfühler der aus zwei Gliedern besteht, von denen das lang eiförmige Endglied etwas kürzer als das vorangehende basale ist. Das basale walzenförmige Glied ist häufig vor seiner halben Länge mit einer ring- oder spangenförmiger Furche schwachwinklig eingeknickt und erscheint dann zweigliederig, ohne dass eine gliedmässige Abgliederung besteht.

Die drei auf den Kopflappen folgenden Segmente sind völlig von einander durch Segmentfurchen getrennt, das erste etwas länger als die beiden folgenden, diese etwa sechsmal breiter als lang; alle Segmente tragen auf kurzen Wurzelgliedern sitzende, leicht abfallende und daher oft fehlende Fühlercirren, schwach gegliederte, drehrunde Fäden, die wohl immer länger als die Segmentbreite sind; nach den Wurzelgliedern trägt das erste Segment jederseits drei, das zweite jederseits zwei, und das dritte jederseits einen Fühlercirrus, so dass diese auf den Kopflappen folgende Strecke im Ganzen 12 Fühlercirren trägt. Borsten oder Stützuadeln habe ich nicht neben ihnen gesehen (Pl. II., fig. 2).

Die folgenden Rudertragenden Segmente nehmen von hinten nach vorn an Länge zu: während die vorderen etwa viermal so breit als lang sind, sind die grössten in der Körpermitte doppelt so breit als lang. Mit dieser Änderung der Dimension geht eine schärfere segmentale Sonderung und grössere Streckung der Ruder Hand in Hand.

Das einzelne Ruder ist einästig, ein von vorn nach hinten abgeplatteter kegelförmiger Fortsatz, der mit zwei ungleich langen Lippen, einer grösseren oberen, und einer unteren kleineren ausläuft; die acht ersten, von vorn nach hinten an Länge zunehmenden Ruder sind nicht so lang als der Körper hier breit; diese Körperstrecke enthält im Innern den dickwandigen Magen; weiterhin werden die Ruder länger und übertreffen die Segmentbreite, bis in der Endstrecke des Körpers diese und die Ruderlänge gleichmässig abnehmen. Mit der stärkeren an diesen Rudern auftretenden Abplattung verbindet sich eine spindelförmige Gestalt der Endstrecke (Pl. II., fig. 4). Zwischen den Lippen tritt ein grosser Fächer langer glasheller zusammengesezter Borsten aus; diese tragen auf dem heterogomphen schraffirten Schaftende ein messerförmiges, auf der Schneide sehr fein gezähneltes, mit kleinem Endhaken auslaufendes Glied, dessen Länge in demselben Bündel von 0·063 mm.–0·21 mm. schwankt (Pl. II., fig. 5). Zu dem Bündel gehört eine einfache grade Stützuadel, deren Spitze in der grösseren Endlippe liegt. Auf der basalen Strecke der oberen Ruderkante steht auf kurzem Wurzelglied ein langer, drehrunder schwach und lang gegliederter Rückencirrus, der mit seiner Länge die Breite des Körpers

übertreffen kann. An der ventralen Kante entspringt etwa auf gleicher Höhe ein ungegliederter griffelförmiger Bauchcirrus, der bis an die Ruderspitze reicht.

Am ruderlosen Aftersegment fehlten die, wohl abgefallenen, Aftercirren.

Über den Kopflappen hinausragte ein kurzer dicker ausgestreckter Rüssel, dessen Eingang von 12 weit von einander getrennten, stumpf kegelförmigen Papillen umgeben war (Pl. II., fig. 1). Auf der dorsalen Fläche des ausgestülpten Rüssels habe ich einmal in der Medianlinie nahe vor dem Vorderrande der Kopflappen einen spitz kegelförmigen Höcker "Facialtuberkel" gesehen. Kiefer fehlten. Im aufgehellten Thier nahm der dickwandige Magen den Raum der acht vorderen Segmente ein. Am Übergang zu dem folgenden graden segmentweise eingeschnürten Darm hing ein Paar kurzer schlauchförmiger Drüsen (Pl. II., fig. 3).

Fundort.—W.Q., 2. x. 03. No. 2 hole, 10 fms.

Dass ich diese Art in die Gattung *Magalia* (Mar. et Bobr.) einreihe, kann beanstandet werden, da den Thieren die Kiefer fehlen, deren Besitz in die Characterisirung der Gattung aufgenommen war. Allein die Bildung und Ausrüstung des Kopflappens, die Zahl der Fühlercirren an den drei ersten nicht verschmolzenen Segmenten, die Form des Ruders, seiner Borsten und Cirren entsprechen ganz den bei der typischen *Magalia perarmata* Mar. et Bobr. vorhandenen Verhältnissen. So mag das Fehlen der Kiefer für die Artbegrenzung Bedeutung haben, und ebenso die Anwesenheit des von mir als "Facialtuberkels" bezeichneten kegelförmigen dorsalen Höckers auf der oralen Strecke des Rüssels, wie er von der Gattung *Leocrates* Kbg. und *Leocratides* Ehl. bekannt ist. Dieser Höcker entspricht aber auch dem ähnlichen Gebilde, das Kinberg* auf der basalen Strecke des Rüssels der *Hesione eugeniae* Kbg. abgebildet hat. Die von Marion und Bobretsky gegebene Diagnose der Gattung *Magalia* ist dann mit Fortlassung der auf den Kieferapparat bezüglichen Worte abzuändern.

ALCIOPIDÆ.

Alciope cari Her.

Hering, Zur Kenntnis der Alciopiden von Messina, Sitzungsber. k. Akad. d. W. Wien, Mathem.-naturw. Cl., Bd. ci., Abth. 1 (1892), p. 753, pl. VI., fig. 1–3.

Fundort.—Lat. 66° 53′ S., 178° 15′ E., 3. i. 02.

Weitere Verbreitung.—Atlantisch, Mediterran.

SYLLIDÆ.

Trypanosyllis gigantea McInt.

Syllis gigantea, McIntosh, Report, 'Challenger,' Zool., vol. xii., p. 193.
Trypanosyllis gigantea, Ehlers, Hamb. magalh. Sammelreise (1897), Polychaeten, p. 35.

Von dieser im antarctischen und notialen Gebiet weit verbreiteten Art sind im Februar und März Thiere mit Schwimmborsten gesammelt.

* Kinberg, Freg. Eugenies Resa, Zool., vii. (1910), pl. XXIII., fig. 8 B.

Fundort.—W. Q., No. 5 hole, 12. iii. 03, 10 fms. — No. 8 hole, 23. iii. 03, 10 fms. — No. 10 hole, 18. vi. 03, 130 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land. Süd-Feuerland, Süd-Georgien, Magelhans Strasse, Kerguelen (Ehlers).

Syllis brachycola Ehl.

Syllis brachycola, Ehlers, Hamb. magalh. Sammelreise, Polychaeten (1897), p. 38.

Die Art ist von der Magellan Strasse und Süd-Georgien im antarctischen Gebiet weit verbreitet; ausser von dem hier gegebenen Fundort auch von der Insel Booth Wandel (Gravier), von Neu Amsterdam, St. Paul und Kerguelen bekannt.

Fundort.—W. Q., 19. iii. 02, 10 fms.

Weitere Verbreitung.—Ins. Booth Wandel (Gravier), Magelhans Strasse, Süd-Georgien (Ehlers), Neu Amsterdam, St. Paul, Kerguelen (Ehlers).

Pionosyllis comosa Gravier.

Gravier, Annélides polychètes, Expédit. antarct. française (1907), p. 15.

Die von Gravier aus Port Charcot beschriebene Art findet sich an den angegebenen Fundorten; in der Sammlung der Deutschen Südpolar-Expedition habe ich sie nicht gesehen.

Fundort.—W. Q., 20. ii. 02, 10 fms.; 23. vi. 02.

Weitere Verbreitung.—Port Charcot (Gravier).

Pionosyllis stylifera Ehl.

Ehlers, Deutsche Südpolar-Expedition.

Fundort.—W. Q., 20. ii. 02; 22. iii. 02, 10 fms. — McMurdo Bay, 28. ii. 02, 20 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land.

Eusyllis kerguelensis McInt.

McIntosh, Report, 'Challenger,' Zool., vol. xii. (1885), p. 191.
E. Ehlers, Hamb. magalh. Sammelreise, Polychaeten (1897), p. 42.
Gravier, Annélides polychètes, Expéd. antarct. française (1907), p. 17.

Fundorte.—W. Q., No. 10 hole, 3. vi. 03, 130 fms. — Cape Adare, 9. i. 02, 20 fms.

Weitere Verbreitung.—Bai Biscoe (Gravier), Feuerland, Kaiser Wilhelm II Land (Ehlers), Kerguelen (McIntosh).

Syllides articulosus Ehl.

Ehlers, Hamb. magalh. Sammelreise, Polychaeten (1897), p. 42.

Die Bestimmung der Art ist bei dem nicht guten Erhaltungzustande des vorliegenden Stückes nicht ganz sicher.

Fundort.—W. Q., 19. iii. 02.

Weitere Verbreitung.—Magellan Str., Feuerland, Kaiser Wilhelm II Land (Ehlers).

Syllides sp.?

Drei vordere Körperstrecken einer epitoken Syllidee gehören zu einer Art der Gattung Syllides. Die Artbezeichnung bleibt unsicher, da fast alle Fühler und Cirren den Thieren fehlen. Nur an einem Thier fand sich ein Fühlercirrus, der undeutlich gegliedert und so lang war, dass er über den Kopflappen hinausragte. Das spricht gegen die Art *Syllides articulosus*, wenn man nicht eine Varietätenbildung annehmen will. Die Form des Kopflappens und seine vier grossen Augen sind wie bei *Syllides articulosus* beschaffen, des gleichen die kurze bräunliche Rüsselröhre. Allein diese weist im ausgestreckten Zustande einen starken Zahn an einem derben Ringe und dahinter niedrige Papillen auf; beides fehlt dem *Syllides articulosus* Ehl.

Die dorsalen langen Bündel feiner Schwimmborsten treten zuerst am 15ten Ruder auf, bei *Syllides articulosus* am 12ten.

Fundort.—W.Q., No. 8 hole, 13. viii. 03, 10 fms.

Autolytus maclearanus McInt.

McIntosh, Report, 'Challenger,' Zool., vol. xii. (1885), p. 207.

Die von mir als *Autolytus maclearanus* bezeichnete Art habe ich bei reicherem Material ausführlich in der Bearbeitung der Sammlung von der Deutschen Südpolar-Expedition behandelt. Hier ist das Vorkommen eines männlichen epitoken Thieres zu erwähnen, das am 19. März 02 gesammelt ist.

Fundorte.—W.Q., 19. ii. 02; 19. iii. 02, 10 fms.; 22. iii. 02, 10 fms. — No. 12 hole, 25–30. ix. 30. — Mollendo Bay, near W.Q., 8. ii. 02, 96–120 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers), Kerguelen (McIntosh).

Autolytus longstaffi, sp. n.*

Als Polybostrichus- und Sacconereisform der gleichen Autolytus-Art fasse ich Würmer auf, die neben einander gefangen waren, die männlichen Thiere zahlreicher als das nur in einem Stücke vorliegende Weibchen.

Polybostrichus (Pl. II., fig. 6).

Die Thiere waren ungleich gross, ein kleines hatte 6·5 mm. Länge, 34 Segmente, ein grösseres bei 12 mm. Länge 60 borstentragende Segmente, beide 7 vordere Segmente ohne Schwimmborsten. Gleichförmig war der Habitus der farblosen Würmer durch die grossen dunklen Augen des Kopflappens, die sehr langen Fühler am Kopf und die Cirren des zweiten Segmentes, so wie durch die sehr grossen Rückencirren der vorderen Segmente und die weit abstehenden Ruder der hinteren Körperstrecke bestimmt.

Der querovale Kopflappen (Pl. II., fig. 6) trägt am Seitenrande jederseits ein grosses kugeliges, aus zweien verschmolzenes Auge. Sein medianer, mit grossem

* Zur Erinnerung an den verdienten Förderer der 'Discovery'-Expedition.

Wurzelglied entspringender Scheitelfühler ist sehr lang und erreicht nach hinten gelegt die halbe Körperlänge. Die paarigen gegabelten Stirnfühler stehen von einander getrennt am Vorderrande des Kopflappen ; ihr Stammtheil und der dickere medianwärts gekrümmte Zinken erscheint durch grosse in Ringen stehende Hautdrüsen wie eng geringelt, der äussere Zinken ist fadenförmig, glatt und längere als der innere ; an der Wurzel des medialen Umfang des Stammtheiles steht ein kurzer kegelförmiger Höcker. Nahe hinter dem Vorderrande des Kopflappen steht auf seiner dorsalen Fläche, nahe dem medialen Augenrande, ein kurzer, schwach keulenförmiger Zapfen.

Das erste buccale Segment ist vom Kopflappen nicht gesondert ; es trägt jederseits zwei dünne fadenförmige Fühlercirren, von denen der dorsale doppelt so lang als der ventrale ist und über den Kopflappen weit hinausragt (Pl. II., fig. 6).

Die folgenden sechs Segmente sind von denen der hinteren, Schwimmborsten tragenden Strecke durch die geringe Ausbildung des Borstenhöckers und grosse Entwicklung der Rückencirren unterschieden, etwa doppelt so breit als lang, wenig von einander gesondert. Das erste von ihnen trägt auf einem fast blasig aufgetriebenen Wurzelgliede einen sehr langen dorsalen Fühlercirrus, der so lang als der unpaare Fühler ist ; unter ihm steht ein einfach fadenförmiger Bauchcirrus, der an Länge dem ventralen Fühlercirrus des buccalen Segmentes gleichkommt ; Borsten habe ich an diesem Segment nicht erkennen können. An den nächsten Segmenten ist der schwach kegelförmige Borstenhöcker wenig länger als die halbe Segmentbreite ; er trägt ein kleines Bündel von Borsten, die auf dem schwach erweiterten Schaftende ein sehr kleines 0·005 mm. langes zweizähniges Endglied tragen. Daneben stehen Borsten, denen das Endglied fehlt und bei denen die eine Ecke des schräg abgestutzten Schaftendes in ein feines Haar ausläuft (Pl. II., fig. 10).

Am dorsalen Umfange der Basis dieser Höcker entspringt ein Rückencirrus, der die Segmentbreite an Länge etwas übertrifft, seine grössere walzenförmige basale Hälfte erscheint—nach Aufhellung in Glycerin—grobkörnig, wohl durch Hautdrüsen, und läuft mit einem dünneren glatten Endfaden aus (Pl. II., fig. 8). Bauchcirren habe ich an diesen Rudern nicht gesehen.

An allen Segmenten der folgenden Körperstrecke ist die grosse Entwicklung der Parapodien auffällig ; diese sind fast doppelt so lang als die Segmente breit, stehen weit von einander entfernt und ragen sperrig seitlich hinaus. Sie entspringen hoch an der Rückenfläche der Segmente, sind fast dreimal so lang als breit, am bisweilen etwas verdickten Ende kurz zweilippig. Die langen Schwimmborsten treten aus dem dorsalen Umfange der Endstrecke aus, an einigen Rudern stehen zwischen den Lippen die zusammengesetzten Borsten der vorderen Segmente. Nahe vor dem Ende steht auf dem dorsalen Umfange ein einfacher fadenförmiger Rückencirrus, der nicht so lang als das Ruder ist (Pl. II., fig. 9). Bauchcirren fehlen. Diese Ruderbildung ist an der ganzen hinteren Körperstrecke vorhanden.

Bei einem Thiere war das ruderlose Analsegment erhalten, das zwei lange, schwach blattartige Aftercirren trug (Pl. II., fig. 7).

Sacconereis (Pl. II., fig. 11).

Das von Eiern fast in der ganzen Körperlänge gefüllte Thier war etwas über 5 mm. lang und hatte 30 Segmente, vom 6ten Ruder ab waren lange Bündel von Schwimmborsten bis zu den letzten Rudern vorhanden.

Der querovale Kopflappen ist in der Mitte des sonst graden Vorderrandes schwach eingeschnitten; er trägt drei schlanke fast gleich lange Fühler, von denen der mittlere auf dem Scheitel nahe vor dem Hinterrande, die beiden seitlichen unter den gerundeten Ecken des Vorderrandes stehen. Auf der hinteren Hälfte liegt jederseits ein Paar rothbrauner grosser linsentragender Augen, mit je einem oberen kleineren und einem unteren grösseren Auge, die Linsen der oberen aufwärts, die der unteren auf- und seitwärts gerichtet (Pl. II., fig. 11).

Alle folgenden Segmenten haben borstentragende Parapodien und sind von Eiern erfüllt, in der mittleren Körperstrecke dadurch aufgetrieben, wenig von einander gesondert, die vorderen und hinteren Segmente halb so lang als die mittleren, alle mehr oder minder doppelt so breit als lang. Das erste Segment ist auf der Rückenfläche gegen den Kopflappen hin zu einer niederen Firste erhoben. Es trägt neben dem Borstenhöcker, der wie an den folgenden Segmenten gestaltet ist, einen fadenförmigen ungegliederten Rücken- und Bauchcirrus. Die Parapodien aller Segmente sind einfache Höcker, in den vorderen Segmenten kürzer als weiterhin, wo sie gestreckter werden, ohne an Länge die halbe Körperbreite zu erreichen. Aus allen tritt an der Spitze ein Bündel kurzer zusammengesetzter Borsten aus, auf deren erweitertem Schaftende ein kurzes doppelzähniges Endglied steht, das mit einer Länge von 0·012 mm. grösser ist als das entsprechende Endglied beim männlichen Thiere. (Pl. II., fig. 12.) Neben diesen zusamengesetzten Borsten finden sich die gleichen anhanglosen Schäfte, wie beim *Polybostrichus*, deren Ecke mit feinem Faden ausläuft. Die vom 6ten Ruder ab auftretenden langen Bündel von feinen capillaren Borsten treten aus einem Höcker am dorsalen Umfange der Ruderbasis aus.

Über der Basis des Borstenhöckers steht ein ungegliederter Rückencirrus, der an den vorderen Rudern nicht so lang als die Segmentbreite ist, an den hinteren Rudern diese Breite an Länge übertrifft. Bauchcirren habe ich nicht gesehen.

Fundort.—W. Q., 18. ix. 03, 10 fms.

LYCORIDÆ.

Nereis vallata Gr.

Synonymie: Ehlers, Die Polychaeten d. magell. u. chilen. Strandes, Festschr. Ges. Göttingen (1901), p. 110.

Fundorte.—Shoe Island, 23. iii. 04. — Will Pt., Laurie Harbour, Auckland Isl., 25. iii. 04.

Weitere Verbreitung.—Indo-pacifisch, Atlantisch.

EUNICIDÆ.

Marphysa aenea Blanch.

Blanchard in Gay, Histor. fis. y pol. de Chile, Zool., iii., Paris (1849), p. 19.
Synonymie: Ehlers, Neuseeländ. Anneliden, ii., Abhandl. k. Ges. d. W. Göttingen, v., 4 (1907), p. 12.

Fundort.—Will Pt., Laurie Harbour, Auckland Isl., 25. iii. 04.

Weitere Verbreitung.—Indo-pacifisch.

GLYCERIDÆ.

Glycera capitata Örd.

Synonymie: Ehlers, Hamb. magalh. Sammelreise (1897), Polychaeten, p. 80.
Vergl. dazu J. Arwidsson, Studien über die Familien Glyceridae und Goniadidae, Bergens Museum Aarbog, xi. (1898), p. 13.

Diese weit verbreitete Art erweist sich durch die hier verzeichneten Funde und andere in der Ausbeute der Deutschen Südpolar-Expedition auch als Bewohner des antarctischen Kreises, und verschiebt damit die Grenzen ihrer Verbreitung auf der südlichen Halbkugel über das Magellangebiet und die Kerguelen weiter südwärts.

Fundorte.—W. Q., No. 12 hole, 4. ix. 03, D. net. — Coulman Isl., 13. i. 02, 100 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Deutsche Südpolar-Exped.); Vielleicht bipolar.

SPIONIDÆ.

Nerinopsis hystricosa sp. n.

Unter diesem Namen führe ich hier nur kurz eine im Plankton auf der Winterstation der englischen und deutschen Südpolar-Expedition häufig gefundene, offenbar bisweilen schwarmweise auftretende *Chætosphæra* an, und verweise für die ausführliche Darstellung auf meine Bearbeitung der Ausbeute der "Gauss"-Expedition. Der Besitz von Wimperkränzen und Binden an der vorderen Körperstrecke und am Analende spricht dafür, dass die Thiere pelagisch schwimmende Larven sind. Ihr Habitus und der Besitz von grossen meist spiralig gedrehten Fühlercirren verweist dann auf Spioniden; der mit einfacher Spitze auslaufende, vier Augen tragende Kopflappen auf die Verwandtschaft zur Gattung *Nerine*. Allein es fehlen auch bei den grössten 3 mm. langen Thieren, die aus der *Chætosphæra* in die gestreckte Form übergegangen sind, die für die Spioniden characteristischen gedeckten Hakenborsten. Die sehr grossen dorsalen und ventralen Fächer starker gerippter Borsten geben den Thieren ein auffallendes Gepräge. Ich habe aus dem Bereich, in dem die Thiere gefunden sind, keine Spionide gefunden, auf welche diese Larven bezogen werden könnten; auch das lässt ihre Beziehung zu dieser Familie unsicher erscheinen.

Nicht ausgeschlossen ist, dass die Thiere stets pelagisch leben, dann müssten sie geschlechtsreif nachgewiesen werden.

Zu beachten ist, dass die Thiere in den Monaten Januar bis April nicht gefunden sind; dass sie auch in den Sammlungen vom October fehlen, mag auf Zufall beruhen, da überhaupt in diesem Monat nur wenig Anneliden gesammelt sind. Danach wäre es möglich, dass die Thiere in den Frühjahrsmonaten nicht pelagisch, sondern bodensässig wären und hier geschlechtsreif würden.

Fundorte.—W. Q., 13. vii. 03, 10 fms. — No. 2 hole, 1. vii. 02, 4 fms.; 1. viii. 02, D. net. — No. 3 hole, 11. vi. 02, 5 fms. — No. 4 hole, 9. v. 03; 29. v. 03, 5 fms.; 18. ix. 03, 5 fms. — No. 8 hole, 28. vi. 03; 24. vii. 03, 10 fms.; 13. viii. 03, 10 fms. — No. 12 hole, 5. xi. 03, 6 fms. — No. 13 hole, 15. xii. 03, 8 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Deutsche Südpolar-Exped.).

"Polytroche Spioniden Larve."

Eine kleine Anzahl von 1·5–2 mm. langen, aus 20–23 borstentragenden Segmenten bestehenden Larven, ungleich weit vorgeschrittener Entwicklung sind nach den nur zum Theil erhaltenen Schwimmborsten, den Kopfanhängen, den dorsalen Anhängen der vorderen Segmente und dem verdickten Analsegment als Spioniden-Larven gekennzeichnet; in diesem sind stäbchenförmige Drüsensekrete eingelagert, wie sie von Spiophanes-Larven beschrieben sind. Der mangelhafte Erhaltungzustand der Thiere lässt keine genauere Angaben zu.

Fundorte.—W. Q., 19. ii. 02. — No. 4 hole, 16. ii. 03, 5 fms.; 18. iv. 03, 10 fms. — Lat. 54° 01′ S., 170° 49′ E., 27. xii. 01.

ARICIIDÆ.

Aricia marginata Ehl.

Ehlers, Hamburg. magalh. Sammelreise Polychaeten (1897), p. 95, pl. VI., fig. 150–156.

Die bis lang von den Kerguelen und von Süd-Georgien bekannte Art ist nach dem hier verzeichneten Funde und der Sammlung der "Gauss"-Expedition weit antarctisch verbreitet.

Fundort.—W.Q., 13. ii. 02. — No. 12 hole, 4. ix. 03, 257 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Deutsche Südpolar-Exped.), Kerguelen, Süd-Georgien (Ehlers).

OPHELIIDÆ.

Travisia kerguelensis McInt.

McIntosh, Report, 'Challenger,' Zool., vol. xii. (1885), p. 357.

Die von Feuerland und den Kerguelen bekannte Art erweist sich nun auch als Bewohner des antarctischen Kreises.

Fundort.—Cap Adare, 12. ii. 04, Laminarian root, 17–20 fms.

Weitere Verbreitung.—Feuerland, Süd-Chile (Ehlers), Kerguelen (McIntosh, Ehlers).

Ammotrypane gymnopyge Ehl.

Ehlers, Bodensässige Annelid., Wiss. Ergebnisse deutsch. Tiefsee-Exped., xvi. (1908), p. 118.

Fundort.—W.Q., 5. vi. 02.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers), Kerguelen (Ehlers).

TYPHLOSCOLECIDÆ.

Sagittella lobifera sp. n.

Der einfarbig gelblich weisse, im Leben vermutlich glashelle 20 mm. lange Wurm ist grade gestreckt, fast drehrund und fast gleichmässig 2 mm. dick, in der vorderen und hinteren Körperstrecke wenig verschmälert; er hatte 20 borstentragende Segmente, die, mit Ausnahme der vorderen verkürzten, so lang oder etwas länger als breit waren (Pl. III., fig. 1). Da die Cirren fast alle abgefallen—im Glase aber daneben vorhanden waren—so traten an ihren Flanken die Borstenhöcker deutlich hervor.

Der mit einer kurzen fadenförmigen, nicht besonders abgesetzten Palpode auslaufende Kopflappen ist kegelförmig, etwas länger als an der Basis breit. An dieser, in die wahrscheinlich ein Segment aufgenommen ist, steht jederseits ein Paar von blattförmigen Cirren, die wie die weiterhin folgenden gestaltet sind; Borsten habe ich hier nicht gesehen.

Auf der Rückenfläche erhebt sich jederseits auf der Grenze zum ersten borstentragenden Segment ein "Nackenorgan," das von fünf, von gemeinsamer Basis ausgehenden kurzen schlauchartig erscheinenden Lappen gebildet wird (Pl. III., fig. 2).

Auf der Bauchfläche des ersten borstentragenden Segmentes steht die weite längsovale Mundöffnung mit schwach gekerbten Rande.

Die borstentragenden Segmente sind gleichförmig; an ihren Seitenumfange steht jederseits ein für die Gattung ziemlich weit vorspringender stumpf kegelförmiger Höcker, aus ihm treten die beiden langen nadelförmigen, gegen die Spitze schwach gekrümmten Borsten heraus und zwischen ihnen wenig vorragend die Stützнadel, die mit einer feinen abgesetzten Endspitze ausläuft (Pl. III., fig. 3).

Über und unter dem Borstenhöcker steht auf kurzem Grundgliede ein blattförmiger Cirrus, der die Länge des Segmentes erreicht, aber Rücken- und Bauchfläche nicht deckt. Die abgefallenen Cirren sind spitz herzförmig mit tief eingeschnittener Basis (Pl. III., fig. 4).

Am Ende des Körpers stand ein ruder- und anhangloses Segment, das ich als Analsegment anspreche, dessen Aftercirren abgefallen sind.

Fundort.—3. i. 02. 66° 52′ S., 178° 15′ O. Pelagisch.

Durch den Besitz der als Nackenorgane bezeichneten Anhänge stellt sich diese Art neben *Sagittella cornuta* Ehl., von der sie durch die viellappige Bildung dieser Anhänge abweicht. Beide Arten bilden wohl eine besondere Gruppe.

Sagittella cornuta Ehl.

Ehlers, Deutsche Südpolar-Expedition.

Zu dieser Art, die durch den Besitz grosser einfacher schlauchförmiger Nackenorgane gekennzeichnet ist, ziehe ich zwei Würmer, deren schlechter Erhaltungzustand die Bezeichnung nicht ganz sicher feststellen liess. Eine ausführliche Beschreibung der Art gebe ich in der Bearbeitung der Anneliden-Sammlung der Deutschen Südpolar-Expedition, in der zahlreiche Stücke vorhanden waren.

Fundort.—W.Q., No. 4 hole, 29. v. 03, 5 fms. — Lat. 49° 40′ S., Long. 72° 18′ 15″ W.

TELETHUSÆ.

Arenicola assimilis Ehl., var. affinis Ashworth.

Ehlers, Hamb. magalh. Sammelreise (1897), Polychaeten, p. 103.
Ashworth, The Anatomy of *Arenicola assimilis* Ehl., Quart. Journ. Microsc. Sc., xlvi. (1903), p. 737.

Der Wurm hat 12 Paar von Kiemen, die erste am 8ten borstentragenden Segment; eine grosse Otokrypte mit kleinen Fremdkörpern.

Fundort.—Auckland Isl., Will Pt., Laurie Harbour, 28. iii. 04.

Weitere Verbreitung.—Im notialen Gebiet von der Magellanstrasse bis zum neuseeländischen Bereich (Ehlers, Benham).

CHLORÆMIDÆ.

Flabelligera mundata Grav.

Gravier, Annélides polychètes, Expédit. antarct. française (1907), p. 37, pl. IV., fig. 31–32.
Ehlers, Deutsche Südpolar-Expedition.

Diese grosse durch ihre dicke und derbe durchscheinende Hülle ausgezeichnete Art ist vielleicht ausschliesslich antarctisch, in diesem Bereich aber weit verbreitet, da sie in den Sammlungen der französischen, englischen und deutschen Südpolar-Expeditionen vertreten ist. Da mir aus der letztgenannten ein reicheres Material vorliegt, gebe ich in dessen Bearbeitung eine ausführlichere Darstellung.

Fundort.—W. Q., 21. iii. 02, 10 fms. — Coulman Isl., 13. i. 02.

Weitere Verbreitung.—Port Charcot (Gravier), Deutsche Südpolar Winter Station (Ehlers).

Trophonia kerguelarum Gr.

Grube, Annelidenausbeute . . . S. M. S. 'Gazelle.' Monatsber. Akad. Berlin, 1877, p. 539.

Fundort.—W. Q., 27. i. 02, 300 fms.

Weitere Verbreitung.—Magellangebiet, Süd-Georgien, Kerguelen (Ehlers).

SCALIBREGMIDÆ.

Oncoscolex dicranochætus Schm.

Schmarda, Neue wirbellose Thiere, I., ii. (1861), p. 55.

Ehlers, Neuseeländ. Annelid., Abhandl. Ges. Wiss. Göttingen, N. F., Bd. III., No. 1 (1904), p. 51.—"Deutsche Südpolar-Expedition."

Synonomie : *Eumenia oculata* Ehlers, Polychaet. magellan. u. chilen. Strandes, Berlin (1891), p. 181.

Zwei vorliegende Stücke weichen in einigen Punkten von der Beschreibung ab, die ich von chilenischen Exemplaren dieser Art gegeben habe. Das eine ist 34 mm. lang und hat 46 borstentragende Segmente, ist also fast doppelt so lang als das früher gesehene und hat 9 Segmente weniger; das andere macerirte und bräunlich gefärbte, dessen Hinterende verletzt ist, hat bei 10 mm. Länge 32 borstentragende Segmente.

Zwischen dem durch die Augenflecken characteristischen Kopflappen und dem ersten borstentragenden Segment tritt auf der Rückenfläche ein Ringel hervor, der an seinem Seitenumfange je eine höckerartige Bildung zeigt; dieser Ringel entspricht wohl dem auf meiner Figur 15 hinter dem Kopflappen angegebenen Ringe, der bei stärkerem Vortreten des Kopflappens weiter zu Tage tritt; ob zum Kopflappen gehörig kann ich nicht entscheiden; eben so wenig, ob seine Anhänge etwa Nuchalorgane sind.

Die Ringelung und Reticulirung des Körpers weicht darin von meiner Beschreibung ab, dass ich einen Unterschied zwischen dreiringeligen vorderen und zweiringeligen hinteren Segmenten hier nicht finde.

Habituell characteristich ist, dass die Borstenbändel aus deutlich vortretenden Parapodialhöckern zwischen einer vorderen und hinteren stumpfen Lippe heraustreten. Dieser Unterschied gegenüber dem früher beschriebenen Wurme geht wohl auf verschiedene Contractionszustände des Körpers zurück; die Warzen, die ich früher neben der Austrittstelle der Borsten beschrieben habe, stehen dann mit diesen Lippen in Zusammenhang.

Fundort.—W. Q., No. 4 hole, 14. xii. 02, 6 fms. — W. Q., No. 12 hole, 4. ix. 03, 25 fms.

Weitere Verbreitung.—Port Jackson (Schmarda), Neu Seeland (Schmarda-Ehlers), Kaiser Wilhelm II Land, Süd-Chile (Ehlers).

MALDANIDÆ.

Maldanella neo-zealandica McInt.

McIntosh, Report, 'Challenger,' Zool., vol. xii. (1885), p. 398, pl. XLVII., fig. 4, pl. XXVa, fig. 13.

Ein bis auf eine Verletzung in der vorderen Körperstrecke ganz erhaltenes Stück

stimmt bis auf wenig Punkte so mit der Beschreibung überein, die Prof. McIntosh von der oben genannten Art gegeben hat, dass ich den Namen dafür verwende.

Es hat 55 mm. Länge, ist etwa 2 mm. gleichmässig breit, und besitzt 20 borstentragende und 2 präanale borstenlose Segmente.

Die Abweichung besteht darin, dass der mediane Kiel des Kopflappen sich über einen grösseren Theil, etwa drei Viertel, der Oberfläche erstreckt als es nach McIntosh Angabe der Fall ist. Querfurchen sind vorhanden, aber undeutlich. Am ersten Segment steht unter dem dorsalen Bündel der Capillarborsten eine kurze Reihe von Haken, wie an den folgenden Segmenten; diese Haken sollen der *Maldanella neozealandica* McInt. wie den beiden anderen Arten der Gattung (*M. antarctica* und *valparaisiensis*) fehlen.

Die vorderen Segmente haben einen wulstig verdickten Vorderrand, sind kürzer als die folgenden, von denen das 5^{te}–10^{te} sich sehr bedeutend verlängert, während die folgenden rasch an Länge abnehmen. Zwei präanale borstenlose Segmente sind kurze Ringe. Das Analsegment hat eine grosse trichterförmige Endlamelle, deren Rand mit 22 kurzen Papillen besetzt ist, die ungleich lang sind und, wenn auch nicht ganz regelmässig, alternieren. Der After steht terminal auf einem kurzen Kegel, der von der Afteröffnung aus radial längsgefurcht ist.

Fundort.—Auckland Island, Will Pt., Laurie Harbour, 25. iii. 04.

Weitere Verbreitung.—Neu Seeland (McIntosh).

Arwidsson* ist geneigt die von McIntosh aufgestellte Gattung *Maldanella* festzuhalten, und nimmt unter deren Charactere das Fehlen der Haken am ersten borstentragenden Segment auf. Das trifft bei dem mir vorliegenden Thiere nicht zu.

AMPHARETIDÆ.

Sabellides elongatus Ehlers.

Ehlers, Deutsche Südpolar-Expedition.

Diese in der Sammlung der Deutschen Südpolar-Expedition von der Winter Station sehr zahlreich vertretene Art ist im Winter Quartier der 'Discovery' nicht, und nur einmal an dem angegebenen Orte in der Tiefe gefunden.

Fundort.—Mount Terror, 22. i. 02, 500 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers).

TEREBELLIDÆ.

Nicolea bilobata Gr.

Terebella (*Phyzelia*) *bilobata*, Grube, Monatsber. Akad. Berlin, 1877, p. 548.

Diese Art ist im Sammelbereich der 'Discovery' häufig gefunden, häufiger als in der Winter Station der 'Gauss' Expedition. In dem von Gravier gegebenen Ver-

* Arwidsson, Studien über die skandinavischen und arktischen Maldaniden, Upsala, 1906, p. 127.

zeichnis der Anneliden von Port Charcot fehlt sie. Die Thiere staken zum Theil in dickwandigen, meist graden Schlammröhren, deren Wände mit Sandkörnern und oft auch mit Spongiennadeln durchsetzt waren. Damit stimmt die Angabe, dass bei Hut Point die Würmer aus Spongien genommen sind. Junge Thiere waren im Februar gesammelt; bei solchen waren die zweiten Kiemen von einfachen kurzen Fäden gebildet.

Fundorte.—W.Q., 20. ii. 02; 28. ii. 02, 107 fms.; 19. iii. 02, 10 fms.; 13. ii. 04. — No. 5 hole, 14. i. 03. — No. 6 hole, 4. iii. 03, 30 fms. — No. 10 hole, 13. vi. 03, 130 fms. — No. 10 hole, 18. ix. 03, D. net. — Hut Point, 18. x. 02; 13. ii. 04, D. net. — Mollendo B., 28. ii. 02, 20 fms. — McMurdo B., 28. ii. 02, 20 fms.

Weitere Verbreitung.—Magalhaens Str. (Grube, Studer.).

Nicolea chilensis (Schm.).

Schmarda, Neue wirbell. Thiere, I., ii. (1861), p. 40.
Synonymie: Ehlers, Die Polychaeten d. magell. u. chilen. Strandes, Festschr. Ges. Göttingen (1901), p. 208.

Ferner:

Terebella gracilibranchis Grube, Annulata Semperiana (1878), p. 230, Taf. XII., fig. 6.
Nicolea gracilibranchis (Grube), v. Marenzeller, Südjapanische Anneliden, II., Denkschr. math. naturw. Kl., Akad. Wien, xlix. (1884), p. 207, Taf. II., fig. 2.

Fundort.—Auckland Isl., Laurie Harbour. Shore, 16. v. 04.

Weitere Verbreitung.—Pacifisch.

Ich bezeichne die an der Küste der Auckland Insel gesammelten Thiere als *Nicolea chilensis* (Gr.) und ziehe als synonym dazu auch die *Nicolea gracilibranchis* (Gr.).

Dabei hebe ich hervor, dass die Zahl der Borstenbündel erheblich schwankt; ich habe vom gleichen Fundort in mehrfacher Zahl Thiere mit 22, 21 Paar von Borstenbündeln gefunden, je einmal solche mit 20, 19 und 17 Paaren von Borstenbündeln. Dieser Unterschied in der Zahl der Borstenbündel gleicht sich dadurch aus, dass auf der Übergangstrecke von der thoracalen zur abdominalen Körperregion über den Flösschen Höcker stehen, die offenbar parapodial sind, aber keine Borsten tragen. Tritt hier eine Borstenbildung ein, so wächst die Zahl der Bündel. Das mag in ungleicher Weise je nach den Fundorten der Thiere variieren.

Wechselnd ist auch das Verhalten der Kiemen. Die zweite Kieme ist immer kleiner als die erste, bisweilen um das Zehnfache, was einmal zur Beobachtung kam; doch kann es sich in diesem Falle um eine Regeneration handeln. Die von von Marenzeller gegebene Abbildung der Kieme ist für den Habitus sehr zutreffend. Wie weit aber die Bildung der Kieme wechselt, geht daraus hervor, dass ich in einem Falle die erste Kieme der rechten Körperseite, wie es für *Nicolea* typisch ist, mit einem astlosen Stamme fand, der in der Endstrecke sich verzweigte, während in der linken Körperseite Seitenäste fast vom Grunde des Stammes ab entsprangen, ohne dass an diesem in besonderer Weise ein contrahirter Zustand zu erkennen war.

Die Formel für die Bezahnung der Hakenborsten war 1–22–3 und 1–222–33.

Die Art hat im pacifischen Meere eine weite Verbreitung von Japan, Philippinen, Juan Fernandez bis nach Neu Seeland und den Auckland Inseln.

SABELLIDÆ.

Laonome antarctica Kbg.

Kinberg, Annulata nova, Öfvers. k. Vet. Akad. Förh., 1866, p. 354.

Diese Art ist mit ihren hornigen braunen Röhren ein characteristisches Glied der antarctischen Fauna. Die grössten hier gefundenen Thiere waren 170 mm. long.

Fundorte.—W.Q., 27. i. 03. — No. 6 hole, 4. iii. 03, 130 fms.; 13. vi. — No. 10 hole, 18. vi. 03, 130 fms. — Glacier hole, 2. i. 04, 180 fms. — Off Cape Armitage, 13. ix. 02, 100 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers), Süd-Feuerland, Süd-Georgien, Marion Ins. (Ehlers), Kerguelen (Kinberg, Verrill, Grube).

Myxicola sulcata sp. n.

Die Thiere (Pl. III., figs. 5, 6) sind gleichmässig gelblichgrau, an den Kiemen etwas heller als am Körper gefärbt; die Oberfläche der vorderen Körperstrecke ist durch starke Drüsenentwicklung im Epithel feinkörnig rauh, an den hinteren Segmenten glatter. Die Körperlänge eines Thieres betrug 31 mm., die Länge der Kieme 13 mm., seine grösste Breite in der vorderen Strecke 4 mm.; in der hinteren Körperstrecke erfolgt eine Abnahme der Breite bis auf etwa ein Viertel; dorsoventral ist der Körper schwach abgeplattet. Die vordere thoracale Körperstrecke besteht aus einem borstenlosen Buccal- und 9 borstentragenden Segmenten, bei 31 mm. Gesammtlänge fielen auf sie 11 mm.; die hintere abdominale Strecke hatte 34 Segmente. Die Rückenfläche der thoracalen Segmente ist von einer tiefen Medianrinne längsgefurcht (Pl. III., fig. 6), einer Fortsetzung der ventralen Längsfurche der abdominalen Segmente, die am 9ten Segment auf die Rückenfläche hinübertritt (Pl. III., fig. 5). Die abdominalen Segmente sind durch tiefe spangenförmige Furchen, die auf dorsaler und ventraler Fläche fast bis an die Medianlinie reichen, zweiteilig.

Die Kieme hat in jeder Hälfte 13 voll entwickelte gleich lange Kiemenstrahlen, die im hinteren Drittel ihrer Länge durch eine dünne Membran verbunden sind (Pl. III., fig. 5), darüber hinaus zeigt der einzelne Strahl einen dünnen Randsaum, läuft mit einem nackten Endfaden aus, auf den sich der Randsaum des Strahles fortsetzt (Pl. III., fig. 7). Die Kiemenfäden stehen zweizeilig dicht gedrängt hinter einander am Strahl, und sind etwa zehnmal länger als der Schaft des Strahles breit ist. Am ventralen Ende jeder

Reihe der Kiemenstrahlen steht ein Strahl, der etwa die halbe Länge der voll entwickelten Kiemenstrahlen erreicht, in der basalen Strecke kurze Fäden trägt, gegen die Spitze hin gezähnelt erscheint. Neben ihm steht ein ganz kurzer, nackter, fast stiftähnlicher Faden (Pl. III., fig. 8).

Das borstenlose Buccalsegment ist auf der Rückenfläche ganz kurz, auf der Bauchfläche zu einem etwa viermal längeren, dreieckigem, mit der Spitze nach vorn gerichteten Lappen ausgezogen. Die vordere Fläche trägt im Grunde des Kiemenkranzes die spaltförmige Mundöffnung, die jederseits von einem breiten lappenförmigen Buccalblatte begrenzt wird.

Das erste der borstentragenden thoracalen Segmente ist etwa halb so lang als die folgenden ; diese sind viermal breiter als lang. An ihren Seiten steht auf der halben Höhe des Umfanges ein niedriger, von vorn nach hinten abgeplatteter Borstenhöcker mit einem Fächer einzeiliger weitläufig gestellter Capillarborsten ; diese Borsten sind glashell einfach, ohne Saumbildung, am Grunde 0·004 mm. breit, in der Endstrecke meist hakenförmig gekrümmt (Pl. III., fig. 10). Andere Borsten habe ich an den thoracalen Segmenten nicht gesehen ; an der Stelle, an der an den abdominalen Segmenten die Haken stehen, machte sich wohl in der Haut ein querer Streifen von kleinen fester erscheinenden Körnern bemerkbar, das waren augenscheinlich Drüsenkörner ; doch liess sich keineswegs feststellen, dass es sich dabei um rudimentäre Borstendrüsen handle, um so weniger als die Bildung nicht constant war.

An den abdominalen Segmenten standen tiefer gegen die ventrale Fläche hin verschoben als an den thoracalen Segmenten Borstenhöcker mit den gleichen hakenförmig auslaufenden Capillarborsten wie dort, nur waren die Borsten etwa um die Hälfte schmäler. Hinter diesen Borstenhöckern liegt in der obenerwähnten spangenförmigen Furche eine Reihe weitläufig stehender Haken (Pl. III., fig. 9), kurze breite Platten, die über die freie Schneide gemessen 0·017 mm. lang, an der Basis nicht ganz halb so breit sind ; ihr Scheitel zeigt in der Seitenansicht zwei grosse spitze Zähne ; die Ansicht der Schneide giebt dafür die Formel : 1–2– oder 1–22– (Pl. III., figs. 11, 12). Der dicke Basalhöcker liess bisweilen eine deutliche Längsschraffirung erkennen. Stützfäden habe ich nicht erkennen können.

Das einfache Aftersegment ist etwa doppelt so lang als das voraufgehende, ohne Borsten, mit terminaler Afteröffnung.

Neben den Würmern lag eine lange unregelmässig gebogene hornartige Röhre, vom Aussehen der Röhren von *Laonome antarctica*. Es ist sehr unwahrscheinlich, dass sie zu der *Myxicola sulcata* Ehl. gehört.

Fundort.—'Discovery' W.Q., No. 10 hole, 18. vi. 03, 130 fms.

Der Mangel ventraler Borsten an den thoracalen Segmenten ist für diese Art characteristisch ; dabei ist zu beachten, dass die Form und Stellung dieser Borsten auch bei anderen Arten ungleich ist.

Die Gattung *Myxicola* war bisher aus dem antarcticschen Kreise nicht bekannt.

SERPULIDÆ.

Serpula vermicularis L. var. narconensis Bd.

Synonymie : Ehlers, Hamburg. magalh. Sammelreise, Polychaeten (1897), p. 140.

Neben den durch die mit trichterförmigen Absätzen auffallend gekennzeichneten Röhren dieser im antarctischen Kreise weit verbreiteten Form fanden sich einzelne Röhren, die mit einfacherer Bildung sich der Stammform näherten : so eine einfache lange Röhre mit nur einem Trichterabsatz (29. i. 02), ferner eine einfache Röhre ohne Trichtererweiterungen, deren Erbauer, wenn auch der Hauptdeckel ihm fehlte, doch wohl sicher als dieser Form angehörig anzusehen ist. Endlich fand sich eine mit den Trichtererweiterungen besetzte Röhre, deren einfache mit einem Längskiel besetzte Anfangstrecke spiralig ansteigend aufgerollt war (13. i. 02).

Fundorte.—W.Q., 29. i. 02, 100 fms. ; 8. ii. 02, 100 fms. — No. 6 hole, 15. ii. 02. — No. 8 hole, 1. iv. 03, 10 fms. — Coulman Isl., 13. i. 02, 100 fms. — Off Cape Armitage, 13. ix. 02, 100 fms. — Hazen Pt., 17. x. 03, 10–20 fms.

Weitere Verbreitung.—Kaiser Wilhelm II Land (Ehlers), Ins. Booth Wandel (Gravier), Kosmopolitisch.

Spirorbis perrieri Caull. et Mes.

M. Caullery et J. Mesnil, Études s. l. morphol. compar. et l. phylogen. des espèces chez les Spirorbes, Bull. sc. de la France et de la Belgique, t. xxx. (1897), p. 208.

Zahlreiche Röhren auf dem Bruchstück einer Alge, theils in einer Ebene aufgerollt, theils in aufsteigenden Windungen.

Fundort.—Cap Adare, 24. ii. 04, 13–20 fms.

Weitere Verbreitung.—Port Charcot (Gravier), Magellangebiet (Ehlers), Patagonien (Caullery et Mesnil).

ANHANG.

Gymnocopa.

Neben den Polychæten fand sich eine kleine Anzahl von Gymnocopen, die ich unter dem Namen *Tomopteris* zusammengefasst hier nach ihren Fundorten erwähne. Eine nähere Artbestimmung konnte ich nicht machen.

Tomopteris sp.

Fundorte.—20. xi. 01, Lat. 57° 25½′ S., Long. 151° 43′ E. — 27. xii. 01, 54° 01¼′ S., 170° 03′ E. — 7. i. 02.— 24. vi. 04, Lat. 58° 49′ 45″ S., 154° 48′ W., 5 fms. — Winter Quart., No. 8 hole, 28. vi. 03. — No. 8 hole, 24. vii. 03, 10 fms.

TAFELERKLÄRUNG.

PLATE I.

FIG. 1.—*Harmothoe tuberosa* sp. n. Ganzes Thier, etwas schräg liegend; Rückenfläche. Vergr. 2.
FIG. 2.—Vordere Körperstrecke; die dorsale Körperwand ist mit Abbiegung der Elytren freigelegt, um die Höcker am Kopflappen und auf der Rückenfläche der Segmente zu zeigen. Vergr. 4.
FIG. 3.—Die Rückenfläche der mittleren Körpersegmente freigelegt, um die einfach werdenden medianen Höcker der Segmente zu zeigen. Vergr. 4.
FIG. 4.—Siebzehntes Ruder von der hinteren Fläche gesehen. Vergr. 8.
FIG. 5.—Abgelöstes Elytron. Vergr. 8.
FIG. 6.—Elytrenwarzen und randständige fadenförmige Papillen. Vergr. 110.
FIG. 7.—7A. Dorsale Borsten in Flächen- und Seitenlage; 7B. Ventrale Borsten in Flächen- und Seitenlage. Vergr. 110.
FIG. 8.—*Harmothoe spinosa* Kbg. Rückenfläche.

PLATE II.

FIG. 1.—*Magalia inermis* sp. n., mit ausgestülptem Rüssel. Rückenfläche. Vergr. 13.
FIG. 2.—Vordere Körperstrecke desselben. Vergr. 24.
FIG. 3.—Übergangstrecke des 'Magens' zum Darm mit den Anhangsdrüsen, aus dem mit Cedernholzöl aufgehellten Wurm. Vergr. 31.
FIG. 4.—Ein Segment aus der Endstrecke des Körpers mit anhängenden Rudern; rechts das Ruder in Kantenansicht von der Rückenfläche, links das Ruder so umgelegt, dass die hintere Fläche vorliegt. Vergr. 37.
FIG. 5.—Borste mit kurzem Endglied. Vergr. 720.
FIG. 6.—*Autolytus longstaffi* sp. n. *Polybostrichus*. Ganzes Thier. Rückenfläche. Vergr. 28.
FIG. 7.—Analende eines anderen Thieres mit Aftercirren. Vergr. 70.
FIG. 8.—Ruder der vorderen Körperstrecke. Vergr. 80.
FIG. 9.—Ruder der hinteren Körperstrecke. Vergr. 80.
FIG. 10.—Zusammengesetzte Borsten. Vergr. 1200.
FIG. 11.—*Autolytus longstaffi* sp. n. *Succonereis*. Vergr. 28.
FIG. 12.—Zusammengesetzte Borste. Vergr. 1200.

PLATE III.

FIG. 1.—*Sagittella lobifera*. Ganzes Thier, Rückenfläche; die Cirren sind abgefallen. Vergr. 6.
FIG. 2.—Vordere Körperstrecke mit dem lappigen Nuchalorgan und einem Cirrus. Vergr. 24.
FIG. 3.—Ruderhöcker mit Borsten. Vergr. 114.
FIG. 4.—Abgefallener Cirrus. Vergr. 33.
FIG. 5.—*Myxicola sulcata* sp. n. Ganzes Thier. Bauchfläche. Vergr. 3.
FIG. 6.—Dasselbe. Rückenfläche. Vergr. 3.
FIG. 7.—Kiemenstrahl. Vergr. 6.
FIG. 8.—Kiemenstrahlen am ventralen Ende der Kieme. Vergr. 6.
FIG. 9.—Hakenreihe und Borstenfächer. Vergr. 180.
FIG. 10.—Capillare Borsten. Vergr. 180.
FIG. 11.—Haken in schräger Seitenlage. Vergr. 1410.
FIG. 12.—Haken von der Schneide gesehen. Vergr. 1410.

Antarctic (Discovery) Exp. Polychæta, Pl. 1.

O Peters del
Bale & Danielsson Ltd imp

Antarctic (Discovery) Exp. Polychæta Pl. II.

O. Peters, del.
Bale & Danielsson Ltd. imp.

Antarctic (Discovery) Exp. Polychæta Pl. III.

C. Peters del.
Bale & Danielsson Ltd. imp.

FRESHWATER ALGÆ.

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(3 Plates.)

A. INTRODUCTORY REMARKS.

Until recently our knowledge of the freshwater Algal flora of the Antarctic has been very deficient, but in the last decade the numerous expeditions that have undertaken the exploration of this region of the earth have brought back collections which are materially adding to the meagre earlier records. Apart from the few older contributions, which are cited in my paper on the Algæ of the South Orkneys,* we have — all within the last ten years — communications by De Wildeman † and Van Heurck ‡ on the Algæ of the Belgian Antarctic Expedition; by Wille § and Holmboe ‖ on Algæ collected by Borchgrevink at Cape Adare; by the present writer * on the Algæ of the South Orkneys, and by W. and G. S. West ¶ on the Algæ collected by Sir E. Shackleton's Expedition in the vicinity of Ross Island and South Victoria Land. Quite recently L. Gain ** has described two species of *Nostoc* from the Antarctic ('Île Jenny'), and speaks of having recognised twenty species of Algæ (mainly Cyanophyceæ and Desmids) growing among mosses.

The collections of the British National Antarctic Expedition were made in the vicinity of Cape Adare (lat. 71° S.), and in the region around McMurdo Strait (lat. nearly 78° S.), *i.e.* in a latitude appreciably farther south than that of the South Orkneys, and this may explain the rather different aspect of the flora in the two cases referred to below (*cf.* Table on p. 6). The two collections have relatively few

* F. E. Fritsch, "Freshwater Algæ, coll. in the S. Orkneys by Mr. R. N. Rudmose Brown of the Scottish National Antarctic Expedition." Journ. Linn. Soc., xl. (1912), pp. 293–338, Pls. 10 and 11.

† E. de Wildeman, "Note préliminaire sur les Algues rapportées par M. E. Racovitza, naturaliste de l'expédition antarctique belge." Bull. Acad. Roy. Belg. 1900, pp. 558–569.

‡ Van Heurck, "Diatomées" in "Résultats du voyage du S.Y. 'Belgica' en 1897–99." Antwerp (1909), pp. 1–128, Pls. I.–XIII.

§ N. Wille, "Mitteilungen über einige von C. E. Borchgrevink auf dem antarktischen Festlande gesammelte Pflanzen," iii., "Antarktische Algen." Nyt Mag. f. Naturvidenskab, xl. (1902), pp. 209–221, Tab. III., IV.

‖ J. Holmboe, iv., "*Navicula mutica* Kütz. aus dem antarktischen Festlande," in N. Wille, "Mitteilungen, etc.," *op. cit.*, pp. 221–222.

¶ W. West and G. S. West, "Freshwater Algæ," in Reports on the Scientific Investigations, British Antarctic Expedition, 1907–9, vol. i., Part vii., London (1911), pp. 263–298, Pls. XXIV.–XXVI.

** L. Gain, "Deux espèces nouvelles de *Nostoc* provenant de la région antarctique sudaméricaine." Comptes Rendus Ac., Paris, clii. (1911), pp. 1691–1694.

species in common, and the representation of the main groups is rather different. The collections made by the members of Sir E. Shackleton's Expedition, on the other hand, come from very much the same region as those which form the subject of the present communication, and there is a considerable degree of resemblance between them, a fact which is especially noticeable as regards the Diatoms. Owing to the very appreciable delay* which has taken place in the preparation of this report, Messrs. West's report on the freshwater Algæ of Sir E. Shackleton's Expedition has appeared since this manuscript left my hands. Professor G. S. West was good enough to forward to me in the summer diagnoses and figures of the new forms found by him and his father, and for the last two months a proof of their paper has been in my hands. I am glad to have this opportunity of thanking Professor West for his courtesy, which has to some extent relieved the great labour of working out the collections.

A considerable number of species and varieties are common to the two collections, and these include several of the new forms described by Messrs. West. Nevertheless the present report brings a considerable number of new records and the descriptions of sixteen new species and five new varieties. We may evidently look to the Antarctic continent to furnish us with quite a large number of new representatives of previously known genera, although thus far no new genera† have come to light. This is rather surprising, as the extreme conditions under which the algal flora of the Antarctic exists might be expected to lead to the development of new types.

The distribution of genera and species in the different groups is as follows:—

	Genera.	Species.
Isokontæ	6	13
Conjugatæ	1	1
Cyanophyceæ	17	52
Diatomaceæ	11	25
Totals	35	91

The prevalence of Cyanophyceous forms and Diatoms, which this table discloses, is true also of the number of individuals. It does not appear that any green Algæ are common in the freshwater flora of the Antarctic, except for species of *Prasiola*, which have long been recognised as important constituents of the flora of these regions, and species of *Pleurococcus* or allied genera. Species of Chlamydomonadaceæ also appear in abundance, but their occurrence is probably rather local. On the other hand numerous Protococcales that are prevalent in the waters of other parts of the earth are completely wanting, the filamentous Chlorophyceæ are represented only by *Ulothrix*, and the whole host of the Conjugatæ are as good as absent. The discovery of a few individuals of a Desmid (*cf.* pp. 20–21) is of great interest in this

* For this delay the author is alone responsible, although largely due to circumstances which were beyond his control.

† A new genus was described among the Algæ of the South Orkneys (*op. cit.*, p. 304), but this came from the yellow snow flora, a type of algal flora that was previously unknown.

connection, as it shows that this group is not altogether unrepresented, although it evidently plays no part in determining the character of the algal flora. It appears that the group of the Conjugatæ becomes gradually less abundant as the Antarctic circle is entered (*cf.* Table on p. 6). Reinsch's reports on the Algæ of Kerguelen and South Georgia* disclose quite a considerable number of representatives of the group; stray representatives were found among the Algæ of the South Orkneys (Fritsch, *op. cit.*); while a study of two separate sets of collections from the extreme southern latitudes, from which the 'Discovery' Algæ were gathered, has been necessary to disclose the presence of a single Desmid. The same statement applies with less force to the filamentous Chlorophyceæ.

The prevalence of the Cyanophyceæ is truly astonishing. Huge sheets of *Phormidium* and occasionally of *Lyngbya* flourish in the ice, and during the milder part of the year in the waters of the ponds and lakes. The so-called "fragments" of these sheets, brought back in a dry condition by the Expedition, indicate the luxurious growth of these forms that must prevail. These sheets serve as a substratum for a rich growth of other Cyanophyceous forms (*Microcystis*, *Chroococcus*, *Lyngbya*, *Oscillatoria*, *Nostoc*, *Calothrix*, *Anabaena*, etc.), as well as for species of *Pleurococcus* (*P. antarcticus* W. and G. S. West, *P. frigidus* W. and G. S. West, *P. koettlitzi* sp. n., *P. dissectus* Nägeli). The composition of this epiphytic flora is largely analogous or identical in the different ponds, as the lists given on p. 4 show. It seems likely that these Cyanophyceous sheets are the breeding places for the bulk of the algal flora. The material at my disposal consisted largely of such sheets with their epiphytic vegetation, but Messrs. West were more fortunate in having several collections containing free-floating Algæ. I have encountered a number of the species recorded by them from these samples as free-floating, leading an epiphytic life on the Cyanophyceous sheets (*e.g. Pleurococcus antarcticus*, species of *Oscillatoria*, etc.).

As regards the actual composition of the blue-green flora the bulk of the species certainly belong to the Oscillarieæ, but a considerable number of genera of Chroococcaceæ are represented, and the 'Discovery' collections contained appreciably more heterocystous forms † than those examined by Messrs. West. In short there is every indication that further investigation will lead to the discovery of most, if not all, of the leading Cyanophyceous genera in the extreme south. This relative abundance of the group has already become evident as a result of the earlier reports on Antarctic Algæ,‡ all of which disclose a prevalence of Cyanophyceæ, and it is evident that this group must be named together with *Prasiola* as an essential characteristic of the Antarctic flora.

There appears to be a great degree of uniformity in the freshwater Diatom-flora of these regions. The common species are *Naviculas* (*N. muticopsis* Van Heurck,

* See Phil. Trans. Roy. Soc. London, 168 (1879), pp. 65–92; and "Die internationale Polarforschung, 1882–83," Die Deutschen Expeditionen und ihre Ergebnisse, Berlin, ii. (1890), pp. 329–365.

† It is interesting to note that a large number of these are new.

‡ *Cf.* P. F. Reinsch, *op. cit.*

TABLE SHOWING THE COMPOSITION OF THE EPIPHYTIC FLORA ON THE CYANOPHYCEOUS SHEETS IN THREE ANTARCTIC PONDS.

Pond half-way between "Black" and "Brown" Islands.	Gap Pond, Winter Harbour.	Pond, Granite Harbour.
Ulothrix subtilis var. *variabilis*.	*Ulothrix subtilis* var. *variabilis*.	*Ulothrix subtilis* var. *variabilis*.
Pleurococcus antarcticus.	*Pleurococcus antarcticus*.	*Pleurococcus antarcticus*.
,, *koettlitzi* sp. n.	,, *koettlitzi* sp. n.	
Prasiola (young stages).	*Prasiola* (young stages).	*Prasiola* (young stages).
Dactylococcopsis rhaphidioides.	*Chroococcus minutus*.	
	,, *minor*.	
	Gloeocapsa rupicola.	*Gloeocapsa rupicola*.
Microcystis parasitica.	*Microcystis parasitica*.	*Microcystis parasitica*.
		Microcoleus vaginatus.
Lyngbya lagerheimi.	*Lyngbya æstuarii* and var. *antarctica*.	*Lyngbya martensiana*.
,, *attenuata* sp. n.	,, *attenuata* sp. n.	,, *scotti* sp. n.
	,, *ærugineo-cærulea*.	
Oscillatoria tenuis.	*Oscillatoria irrigua*.	*Oscillatoria tenuis*.
	,, *koettlitzi* sp. n.	
Calothrix antarctica sp. n.	*Calothrix intricata* sp. n.	
	,, *gracilis* sp. n.	
Nostoc sphæricum.	*Nostoc disciforme* sp. n.	
	,, *longstaffi* sp. n.	
	,, *hederulæ*.	
	,, *fuscescens* sp. n.	
	Anabæna antarctica sp. n.	
Nodularia quadrata sp. n.	*Nodularia spumigena* var. *minor*.	
Navicula muticopsis.	*Navicula muticopsis*.	*Navicula muticopsis*.
,, *cymatopleurus*.	,, *murrayi*.	,, *borealis*.
,, *shackletoni*.		,, *shackletoni*.
,, *globiceps*.		
	Hantzschia elongata.	*Hantzschia amphioxys*.

N. globiceps Greg., *N. shackletoni* W. and G. S. West, *N. cymatopleurus* W. and G. S. West, *N. borealis* Kütz.), *Fragilarias* (especially *F. tenuicollis* Heib. var. *antarctica* W. and G. S. West) and *Hantzschias* (*H. amphioxys* Grun., and *H. elongata* Grun.), while the other genera appear to be more casual.* Diatoms were rather scantily represented in my material, being common only in two of the samples; in many habitats they were exceedingly rare.

In comparison with Arctic regions the scarcity of green Algæ is very noticeable (*cf.* W. and G. S. West, *op. cit.*, p. 265). The publications of Nordstedt † and others have shown that Desmids are relatively abundant in these regions. The other green Algæ are well represented, while the Cyanophyceæ are appreciably less important. Some of the species of *Chlamydomonas* (*C. caudata* Wille,‡ and

* Messrs. West also mention the abundant occurrence of *Tropidoneis lævissima* W. and G. S. West, in some of the lakes; I have not met with this form. It should be remarked that abundant fragments of the valves of diverse Centricæ were observed in several samples, although intact specimens were rare.

† Nordstedt, Desmid. ex ins. Spetsbergensibus et Beeren Eiland in expeditionibus ann. 1868 et 1870 suecanis collectæ. Öfvers. af Kgl. Vet.-Ak. Förhandl. (1872), Stockholm, No. 6, p. 23; Nordstedt, Desmidieæ arctoæ, *op. cit.* (1876), No. 6, p. 13.

‡ *Cf.* F. E. Fritsch, *op. cit.*, p. 322.

C. subcaudata Wille) and *Chloromonas alpina* Wille, are, however, as yet only known to occur in the Antarctic and in the north of Europe, although it is hardly likely that future investigation will fail to reveal their occurrence in intermediate regions.

Another interesting case of distribution is that of species like *Chloromonas alpina* Wille, and the genus *Eucapsis*, which have hitherto only been recorded from alpine habitats. Parallel cases have long been known in the Arctic regions.

The collections of the 'Discovery' did not include any material of snow floras. On the other hand, two samples (Cape Adare, January 9th, 1902; McMurdo Bay, September 13th, 1902) came from the ice. It will be useful to give a list of the commoner species found in these two habitats :—

Cape Adare (in freshwater ice under boulder).	McMurdo Bay (dull brick coloured ice).
Chloromonas alpina Wille.	*Microcystis parasitica* Kütz. var. *glacialis* var. n.
	„ *parasitica* Kütz.
Eucapsis minuta sp. n.	„ *merismopedioides* F. E. Fritsch.
	Phormidium frigidum sp. n.
Navicula muticopsis Van Heurck.	**Pleurococcus antarticus* W. and G. S. West.
	* „ *dissectus* Näg.
„ *cymatopleura* W. and G. S. West.	**Nostoc disciforme* sp. n.
	**Melosira* sp. (*cf.* p. 46).
„ *seminulum* Grun.	*Fragilaria tenuicollis* Heib. var. *antartica* W. and G. S. West.
Surirella angusta Kütz.	*Navicula seminulum* Grun.
	„ *muticopsis* Van Heurck.
	„ *cymatopleurus* W. and G. S. West.
	„ *shackletoni* W. and G. S. West.
	„ *globiceps* Greg.

The colour of the ice in the second case was due to *Microcystis parasitica* Kütz. var. *glacialis* nov. var. The species marked with an asterisk did not grow directly on the ice, but were epiphytes on the *Phormidium*.

As above mentioned, the bulk of the material collected by the members of the British National Antarctic Expedition consisted of *Phormidium*-sheets with their abundant epiphytic flora. The general character of this flora is sufficiently illustrated by the Table on p. 4. Only a few samples comprised free-floating forms, the more important of which were as follows :—

Chlamydomonas subcaudata Wille.
„ *intermedia* Chod.
„ *ehrenbergi* Gorosch.
Hormidium stage and young packets of *Prasiola*-cells.
Penium sp. (*cf.* pp. 20, 21).
Microcystis marginata (Menegh.) Kütz.
Merismopedia tenuissima Lemm.
Eucapsis minuta sp. n.
Phormidium antarcticum W. and G. S. West.
Oscillatoria tenuis Ag. and other species.
Nostoc disciforme sp. n.
„ *longstaffi* sp. n.
„ *fuscescens* sp. n.
„ *sphæricum* Vauch.
Nodularia quadrata sp. n.
Navicula muticopsis Van Heurck.
„ *globiceps* Greg.
„ *shackletoni* W. and G. S. West.
„ *cymatopleurus* W. and G. S. West.

It is hardly likely that this list approaches completeness, but it is probably fairly representative of the general character of the floating flora. In particular the number of free-floating Diatoms is certainly appreciably greater.

The material included a considerable number of samples from the Gap pond, Winter Harbour, collected on four distinct occasions during 1902–1904. A critical survey of these samples has failed to give any marked indication of periodicity, although the period of collecting is spread over more than two months, which in milder climates is quite enough to afford a prominent periodical change. The samples collected in February (*i.e.* fairly late in the Antarctic summer) were rather richer in heterocystous Cyanophyceæ than the others, but this may well be due merely to chance. No doubt the severe climatic conditions do not admit of a rapid and abundant development of any one form or set of forms during the short summer, and hence there can be no marked periodicity. One altogether tends to come to the conclusion that reproduction in the bulk of the Antarctic Algæ must be a very slow process and possibly several seasons elapse before a new generation reaches to maturity. In the case of the unicellular green representatives of the flora matters will, however, be different, and the cyst-formation of *Chlamydomonas subcaudata* Wille, described on p. 8, indicates the alternation of a marked resting-stage and a motile stage in the annual cycle.

In conclusion the following Table will serve (in further illustration of some of the above remarks) to contrast the algal floras of Kerguelen and South Georgia, the South Orkneys and the regions from which the 'Discovery' and Shackleton's Expeditions collected their Algæ.

	South Georgia and Kerguelen.*		South Orkneys.†		'Discovery' and Shackleton's Expeditions.‡	
	Genera.	Species.	Genera.	Species.	Genera.	Species.
Protococcales	18	28	13	24	5	13
Siphonales (including *Vaucheria*)	1	6	..	..	..	..
Ulotrichales (including *Oedogoniaceæ*)	15	25	4	5	2	7
Conjugatæ	9	31	4	5	1	1
Heterokontæ	1	1	1	1	..	..
Phæo- and *Rhodophyceæ*	2	2	..	..	..	..
Chroococcaceæ	5	7	8	10	9	20
Oscillarieæ	4	4	2	5	6	41
Heterocystous Cyanophyceæ	10	26	3	3	5	16
Diatomaceæ	18	35	9	15	19	42

* Compiled from Reinsch's papers; see footnote on p. 3.

† Cf. Fritsch, *op. cit.*

‡ Compiled from the present report and that of Messrs. W. and G. S. West (*op. cit.*).

B. SYSTEMATIC ENUMERATION OF THE SPECIES OBSERVED.

ISOKONTÆ.

CHLAMYDOMONADACEÆ.

Genus Chlamydomonas Ehrenb.*

1. Chlamydomonas subcaudata.

(Pl. I., figs. 1–14 and 20.)†

Chlamydomonas subcaudata Wille, "Algol. Notizen," xi., Nyt Mag. f. Naturvidenskab, lxi. (1903), pp. 118–120, Tab. III., figs. 12–18.

Long. cell. = 13–20 μ; lat. cell. = 7–14 μ; diam. cyst. = 11–17 μ aut 17–18 μ × 15–16 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902.

This species was abundant in the above habitat together with *Chlamydomonas intermedia* and *C. ehrenbergi*; it is also recorded together with the first-named species by Messrs. W. and G. S. West from Pony Lake (*op. cit.*, p. 274). A similar and closely allied species, *C. caudata* Wille, was abundant in material collected from a pond in the South Orkneys (*cf.* Fritsch, *op. cit.*, p. 322). These two species have, as far as I am aware, hitherto only been recorded from slightly brackish ponds not far above high-tide level at Aalesund in Norway (Wille, *op. cit.*, pp. 118 and 119), so that their occurrence in temperate and tropical waters still remains to be established. It is scarcely probable that they are restricted to the cold regions of the earth.

The dimensions above given for *C. subcaudata* are appreciably smaller than those given by Messrs. W. and G. S. West, although both sets of measurements are almost included in the extremes given by Wille (viz., 15–39 μ long, 8–18 μ broad). The marked difference in size of the individuals seen by Messrs. West and myself indicates the occurrence of a large and small form of the species.

With regard to the general characters of *C. subcaudata* there is not much to add to previous descriptions. The cell-membrane was always separated by a narrow space from the contents (figs. 1–5), but was not quite as prominently thickened as Wille describes it. In the majority of the individuals the posterior

* In material from the Gap pond, Winter Harbour, *Palmella*-stages, looking like those of a *Chlamydomonas*, were found on the surface of the *Phormidium*-sheets; they could not be further determined. Cells oval or circular with a pyrenoid, about 8–9 μ broad; mucilage hyaline, not stratified.

† Nearly all the illustrations in this paper are the work of my wife.

end was acutely pointed (figs. 1, 3, 4), but in some cases it was more or less completely rounded off (figs. 2, 5). The cells are frequently somewhat asymmetrical about the longitudinal axis (fig. 1), sometimes even to a marked extent (fig. 4), but in other cases (fig. 3) the cell was quite symmetrical, the pointed termination being median. The shape of the individuals thus varies a good deal, but the elongated form figured by Wille (*op. cit.*, figs. 12, 13, 14) was rare (*cf.* my fig. 5). The position of the nucleus is variable, as the figures show; in some cases it is quite near the front end of the cell (see especially fig. 2), in others much nearer the pyrenoid (fig. 3). The latter was always situated near the middle of the cell, but obviously in the posterior half. In many individuals the longitudinal ribbing of the chloroplast was very prominent; the chloroplasts were often charged with numerous small starch-grains. Division-stages were not uncommon, division being effected by oblique planes as recorded by Wille and the Wests.

In a considerable number of the individuals encystment had taken place (figs. 6–11). Within the colourless membrane of the mother-cell the contents had become rounded off into an oval or spherical mass and surrounded by a rather thick and often stratified wall (figs. 6 and 7). Laterally this new envelope is almost in contact with the old cell-membrane, but at the front and back ends of the cell there is a considerable space between the two (figs. 6 and 7). The pointed posterior end of the old cell-membrane is often very distinct (fig. 6). The contents undergo no apparent change in this process of encystment, the pyrenoid retaining its posterior and the nucleus its anterior position, and the shape of the chloroplast is often quite recognisable (fig. 6). The cilia are evidently drawn in or cast off prior to the occurrence of encystment, as no traces of them could be found in these individuals. Perfectly similar encysted individuals were found in which the membrane of the cyst showed protrusions of various kinds (figs. 8–10). These protrusions are either single (fig. 8) or there are two of them (figs. 9, 10), and, as the figures show, they are developed to a very varying extent. Sometimes they cause protrusions of the old mother-cell membrane (fig. 10) and lead to the assumption of very irregular shapes. Free cysts, which had escaped from the enveloping mother cell-membrane, were abundant among the ordinary *Chlamydomonas*-individuals, appearing as circular or oval cells with a rather thick and stratified membrane and the characteristic angular pyrenoid of the species (figs. 11–13). Occasionally in these cells the membrane is much more markedly thickened on one side than on the other (*cf.* fig. 11). Now and again a cell of this kind with two pyrenoids was observed (fig. 14), thus possibly indicating the commencement of division. Stages like that shown in fig. 20, in which the contents of the cyst have undergone division into four parts, were extremely rare. It is not known what the further fate of these cysts is.

Similar cysts are known for other species of *Chlamydomonas* and its allies; Dill ("Die Gattung *Chlamydomonas* und ihre nächsten Verwandten," Berlin, 1895)

has recorded them for *C. gigantea* Dill, Wille (*op. cit.*) for *C. marina* (Duj.) Cohn, *Chloromonas alpina* Wille, etc.

The spherical cysts bear an appreciable resemblance in size, thickness of wall and general character to a "forma cellulis plerumque globosis sed hinc inde angulosoglobosis e mutua pressione" of *Pleurococcus pachydermus* Lagerh., described by Messrs. West (*op. cit.*, p. 275), and, before their connection with *Chlamydomonas subcaudata* was noticed, I was for referring these cells to that form. The pyrenoids of this form of *Pleurococcus pachydermus*, however, appear to be circular and not angular, and the chloroplast is described as "parietal" and "of considerable extent"; the wall is also thicker and more prominently stratified. It is therefore quite possible that the two forms bear no relation to one another, but of this I do not feel absolutely certain, the more as it is not quite apparent on what grounds the Wests refer their form to *Pleurococcus pachydermus*. Lagerheim's original description and figures ("Bidrag till kännedomen om Stockholmstraktens Pediastréer, Protococcacéer och Palmellacéer," Ofvers. af Kgl. Vet.-Ak. Förhandl., 1882, No. 2, pp. 78–79 and Tab. III., figs. 40–42) give no indication of a pyrenoid in the cells, and the membrane, though thick, is not stratified. The presence of a pyrenoid is of course a rather variable feature in the genus *Pleurococcus*, but the cells of Messrs. West's form are certainly as much like the cysts of *Chlamydomonas subcaudata* as they are like Lagerheim's figures of *Pl. pachydermus*. The processes sometimes developed on the cysts recall in some ways the process on Messrs. West's forma *stipitata*, but those on the cysts have a much broader attachment and do not attain to nearly the length of those of the form described by the Wests.

2. Chlamydomonas intermedia.

(Pl. I., figs. 15–18.)

Chlamydomonas intermedia Chodat, Bull. Herbier Boissier, ii., p. 590, t. 22, 23; Wille, *op. cit.*, p. 142, t. iv., fig. 15.

Long. cell. = 10–13 μ; lat. cell. = 6–8 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902.

This species has also been found in material from a pond in the South Orkneys (Fritsch, *op. cit.*, p. 324) and by Messrs. W. and G. S. West (*op. cit.*, p. 275) in Pony Lake. The first of the three samples from the pond at Cape Adare was almost a pure culture of this species, and exhibited a considerable degree of variation in the individuals. The pyrenoid, which was frequently angular, was generally situated in the posterior half of the cell (*cf.* W. and G. S. West, p. 275) and not in the middle. The nucleus lay just in front of the pyrenoid (*i.e.* in the middle of the cell, figs. 15, 17), sometimes directly adjacent to it (fig. 16), and was not uncommonly slightly shifted to one side of the cell (fig. 16);

an extreme case is shown in fig. 18. The stigma, however, was the most variable feature of all; in shape it was generally elongated and somewhat curved (figs. 15, 18), but occasionally it was almost round or oval (figs. 16, 17); it was generally situated in the back half of the cell, slightly in front of the pyrenoid (fig. 15), but this position was by no means constant, and in some of the individuals it was found quite close to the front end (fig. 18) or even (though rarely) quite near the back end of the cell (fig. 17). In a number of individuals, moreover, more than one stigma (up to three) was apparent, the respective stigmata either being close together or somewhat removed from one another (figs. 17, 18).

Messrs. West refer their *C. intermedia* to a forma *antarctica* ("forma minor, stigmata juxta pyrenoidem"). The individuals from Cape Adare were even slightly smaller than those recorded by these authorities, and in this respect they agree with f. *antarctica*, but the position of the stigma, as above mentioned, was rather variable and by no means always adjacent to the pyrenoid.

3. Chlamydomonas ehrenbergi.

(Pl. I., fig. 19.)

Chlamydomonas ehrenbergii Gorosch., Beitr. z. Morph. u. Systematik d. Chlamydomonaden, Bull. Soc. Imp. d. Naturalistes de Moscou, 1891, pp. 128–131, Tab. III., figs. 10–25; Wille, *op. cit.*, pp. 123–124, Tab. IV., fig. 18.

Long. cell. = 14–22 μ; lat. cell. = 10–17·5 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902.

This form is readily distinguished from *C. intermedia* Chod. by the shape of the cells, which are ovoid and bluntly pointed at the front end; the greatest width of the cell is about one-third of the way from the back end. It was a rare form, far less abundant than the two previous species.*

Genus Chloromonas Gobi.

4. Chloromonas alpina.

(Pl. I., figs. 21–25.)

Chloromonas alpina Wille, *op. cit.*, pp. 122–124 and 152, Tab. III., figs. 24–34.

Long. cell. = 10–11 μ; lat. cell. = 6–8 μ.

Hab.—In freshwater ice under boulder, Cape Adare, January 9th, 1902.

This species appears previously only to have been recorded by Wille from

* A species of *Chlamydomonas* was also observed in a sample from the ice, McMurdo Bay, September 13th, 1902, but the material was too scanty and the preservation too bad to admit of its determination.

"Rondane" in Norway, where it was found on snow. The Antarctic individuals, like those described by Wille, lacked all traces of a pyrenoid. The nucleus (figs. 21–25) was prominent and situated in the centre of the cell, in which respect the specimens differed from those described by Wille (*cf.* however, his fig. 25, where the nucleus appears to be quite central). Numerous discoid chloroplasts were frequently recognisable in the cells, and in some cases a slightly elongated stigma could be made out, not far from the bases of the cilia (figs. 21, 25). Some of the individuals were practically devoid of starch, while others contained a considerable amount. The cilia were so delicate that in some of the individuals it was only possible to trace them a very short way, but they appeared in general to be a little longer than the body of the cell (fig. 21).

Some of the individuals were of a more elongated form than those described and figured by Wille (long. cell. = 13 μ; lat. cell. = 6 μ, figs. 23, 24), but in view of their resemblance to the type in other respects, I do not think that they belong to a different species.

PROTOCOCCACEÆ.

Genus Trochiscia Kütz.

5. Trochiscia crassa.

Trochiscia crassa Hansg., Physiol. und Algol. Mitteil. (1890), Tab. I.; Prodr. d. Algenfl. v. Böhmen, ii. (1892), pp. 240–241.

Diam. cell. = 50–55 μ. Cell-wall deep brownish-red, opaque.

Hab.—Granite Harbour, freshwater pond, January 20th, 1902.

ULOTRICHACEÆ.

Genus Ulothrix Kütz.

6. Ulothrix subtilis var. variabilis.

Ulothrix subtilis Kütz., Phycol. Germ. (1845), p. 197; Tab. Phycol. ii. (1852), Tab. 85, fig. 1.
Var. *variabilis* (Kütz.) Kirchner, Alg. Schlesien (1878), p. 77.

Crass. fil. = 6–7 μ; cells one and a half times or twice as long as broad.

Hab.—Freshwater pond in ice off "Black Island," McMurdo Strait, December 31st, 1902; Gap pond, Winter Harbour, December 15th, 1903 (in both cases on surface of *Phormidium*).

This form was not common.

PLEUROCOCCACEÆ.

Genus Pleurococcus Menegh.

7. Pleurococcus frigidus.

(Pl. I., figs. 43, 44.)

Pleurococcus frigidus W. and G. S. West, *op. cit.*, p. 276, Pl. XXIV., figs. 40–44.

Diam. cell. = 20–22 μ.

Hab.—Freshwater pond among eskers four miles north of Black Island, upon ice, McMurdo Strait, September 12th, 1902; Gap pond, Winter Harbour, February 20th, 1904.

This form was rare and was always found attached to the *Phormidium*-sheets.

8. Pleurococcus antarcticus.

(Pl. I., figs. 26–35.)

Pleurococcus antarcticus W. and G. S. West, *op. cit.*, pp. 276–277, Pl. XXIV., figs. 49–51.

Hab.—Very widely distributed on the *Phormidium*-sheets, especially Gap pond, Winter Harbour, ponds in eskers near Black and Brown Islands, etc.

This is a very striking and characteristic constituent of the epiphytic vegetation of the abundant *Phormidium*-sheets, but obviously much more variable than Messrs. W. and G. S. West's material would lead one to suppose. According to their diagnosis the characteristic features of the species are: the large spherical cells, which are isolated or aggregated in small families; the thick cell-wall, which is homogeneous or obscurely stratified; a large, indistinctly limited, parietal chloroplast; the frequent presence of drops of oil. The form, they observed, was free-floating, but they also distinguish a forma *robusta* (*op. cit.*, p. 276, Pl. XXIV., figs. 52–54), which grows on the surface of the Cyanophyceous strata; this form has huge cells with a very thick, stratified membrane and is stated to lack drops of oil.

I have observed no free-floating specimens of *P. antarcticus* at all, probably because my Antarctic material was mainly such as had grown attached to some substratum. There occurred, however, on some of the *Phormidium*-sheets groups of cells agreeing in all respects (except in the attached habit) with Messrs. West's description (f. *simplex*, *cf.* below). These cells varied in diameter between 18 and 35 μ, the commonest dimension being 20 μ; they contained no pyrenoid, but often numerous starch-grains; and globules of oil varying in size and number were often present between the thick walls and the contracted contents (Pl. I., figs. 30, 31).

In other groups of cells, however, one (rarely two) pyrenoids were conspicuous after staining with iodine, these cells otherwise agreeing in all respects with those just described (Pl. I., fig. 32, f. *typica*, *cf.* below). In other groups of cells again (Pl. I.,

figs. 26, 29) the pyrenoids were much larger and starch-formation was confined to their immediate neighbourhood. It is evident, therefore, that in *P. antarcticus*, as in some other species of *Pleurococcus*, the presence of a pyrenoid is a variable feature. A pyrenoid was not observed in the large cells of forma *robusta*.

The distribution of the fatty oil in the cells of *P. antarcticus* is evidently also very diverse. Sometimes it appears equally diffused through the cell-contents, which then present a whitish, highly refractive appearance (figs. 30, 31); in other cases it is located between cell-membrane and the contracted contents (figs. 26, 31–33), as already described. A very characteristic form taken by the fat is that shown in fig. 29, where it occurs in the shape of a considerable number of lumps, projecting radially from the periphery of the contracted contents and giving the latter a peculiar spiked appearance; such cell-groups are very common. Drops of oil are also found between cell membrane and contents in forma *robusta* (figs. 34, 35).

The size of the cells is also very variable; it varies from 7 μ in forma *minor* (*cf.* below) to nearly 100 μ in particularly large specimens of forma *robusta*. The commonest dimension of the cell in my material was about 20–22 μ (in the Wests' material 32 μ). Not uncommonly all the cells of a group are approximately of the same size (figs. 26, 27, 29, 32), but in other cases the cells of a group are of very unequal dimensions. Occasionally the cells appear arranged in well-marked chains (fig. 28, f. *filamentosa*, *cf.* below).

In a few cases the contents of the larger cells were tinged a deep reddish-yellow colour.

On the basis of these observations I give the following emended diagnosis of the species and a list of its principal forms:—

PLEUROCOCCUS ANTARCTICUS W. and G. S. West, emend.

Cellulis globosis (vel rarius ellipsoideis), in forma typica 10–37 (plerumque 20 vel 32) μ latis (sed in aliis formis, 7–100 μ latis), singulis vel in familiis parvis aggregatis, inter algas Myxophycearum libere natantibus vel intra stratum Myxophycearum nidulantibus, membrana cellularum usque ad 2·2 μ crassa, homogenea vel plus minusve distincte lamellosa; chromatophora magna, parietali, indistincte limitata, plerumque cum pyrenoide conspicuo; oleum saepe adest, forma globulorum conspicuorum vel in cytoplasmate diffusum. Propagatio ignota.

Forma *typica* (Pl. I., fig. 26).

Cellulis singulis vel in familiis parvis aggregatis, 10–37 μ latis, cum pyrenoidibus conspicuis et globulis oleariis inter membranam cellularum et cytoplasma dispositis; membrana cellularum usque ad 2·2 μ crassa, homogenea vel distincte lamellosa.

This was the most widely distributed form in the 'Discovery' material.

Forma *minor* (Pl. I., fig. 27).

Cellulis multo minoribus, 7–8 μ latis, exacte globosis vel modice anguloso-globosis e mutua pressione, in familiis parvis cellularum æqualium aggregatis intra stratum *Phormidii* nidulantibus; membrana cellulæ eodem modo quo in typo incrassata; chromatophora cum pyrenoide.

This form gives rise to one-layered strata of circular or somewhat polygonal cells of almost uniform size. This going hand in hand with the small dimensions of the cells gives the strata a very characteristic regular appearance, in marked contrast to the generally non-uniform strata of the larger-celled type. The cell-membrane is prominently thickened to the same relative extent as in the larger forms, and the cells have a conspicuous pyrenoid.

Forma *robusta* W. and G. S. West, *op. cit.*, p. 276, Pl. XXIV., figs. 52–54.
(Pl. I., figs. 34–35).

Cellulis majoribus vel multo majoribus, 35–78–100 μ latis, globosis vel distincte ellipsoideis, intra stratum Myxophycearum nidulantibus, solitariis vel saepe dense aggregatis; membr. cell. 2·5–6 μ crassa et lamellosa; chromatophora saepe distincte parietali, globulis oleariis nullis vel magnis et conspicuis.

The cells of this form attain immense dimensions and, although ordinarily spherical, as the Wests' figures show them, are sometimes ellipsoidal (figs. 34, 35). In my material the cells of this form generally contained large and conspicuous oil-globules between the membrane and the contents. A pyrenoid does not appear to occur. Occasionally the cell-contents are reddish-brown (*cf.* above). The outer surface of the wall is frequently somewhat irregular, giving the appearance of flakes of membrane becoming detached.

Forma *filamentosa* (Pl. I., fig. 28).

Cellulis globosis vel modice depresso-globosis, 14–20 μ latis, in filamentis brevibus dispositis, intra stratum Myxophycearum nidulantibus, cum pyrenoidibus conspicuis.

This form is rare.

Forma *simplex* (Pl. I., figs. 30, 31, 33).

Cellulis globosis, 18–35 μ latis, solitariis vel in familiis aggregatis, intra stratum Myxophycearum nidulantibus vel libere natantibus, *sine pyrenoidibus*, sed cum granulis amylaceis multis.

This is the form originally described by Messrs. W. and G. S. West. The form with small pyrenoids shown in fig. 32 connects f. *simplex* with f. *typica*.

Forma *stellata* (Pl. I., fig. 29).

Cellulis globosis, ut in forma typica, saepe ca. 30 μ latis, cum globulis oleariis conspicuis, radiatim circum cytoplasma cellularum dispositis.

In view of the fact that this characteristic arrangement of the oil-drops was noticed in all the cells of certain groups, it appears to be typical of a definite form of the species.

9. Pleurococcus koettlitzi* sp. n.

(Pl. I., figs. 36–42).

Cellulis globosis vel saepe plus minusve ellipsoideis, plerumque 11–16 μ latis, in familiis parvis irregularibus vel coelastriformibus vel quadricellularibus et tetraedricis aggregatis ad superficiem stratuum *Phormidii* affixis; membrana cellularum tenui, sed distincta; contentu homogeneo, obscurato accumulatione magna olei, quod semper adesse videtur et facit in familiis cellularum aspectum valde refringentem et saepe nigrescentem; contentu interdum rubescente; chromatophora singula probabilis est, cum pyrenoide. Propagatio divisione contentus cellulæ in quatuor cellulas filiales, quae sunt tetraedrice dispositæ.

Diam. cell. = 11–16 μ; cell. ovales plerumque 15 μ long. et 12–13 μ lat.

Hab.—Widely distributed on the *Phormidium*-sheets, especially from the Gap pond, Winter Harbour.

The most prominent characteristics of this species are the often slightly oval shape of the cells, the very prominent storage of fatty oil and the tetrad-like grouping of the cells in young and often in older families. Young colonies are not uncommonly to be found in which the four cells form an obvious tetrad (figs. 37, 39, 41); in the older colonies the grouping of the cells is frequently very similar to that of such a form as *Coelastrum microporum*, but, when the colonies consist of very large numbers of cells, their grouping becomes irregular (fig. 36). Even in these irregular colonies, however, individual groups of cells are often in tetrads. This prevalent tetrad-like grouping is undoubtedly due to the method of reproduction, four daughter-cells arising within the membrane of the mother-cell (fig. 40, only three cells are visible); it appears that some of the cells of the tetrad may occasionally abort (*cf.* fig. 42). As detached pieces of cell-membrane are sometimes found lying near the colonies of this species it seems probable that the membrane of the mother-cell is ruptured and does not undergo gelatinisation.

The fatty oil generally obscures the whole of the cell-contents and gives the colonies, under the low power of the microscope, a dark highly refractive appearance which is very characteristic. Osmic acid gives a deep brownish-black colouration. In some of the larger colonies the contents of occasional cells may be tinged yellowish-red, without these cells presenting any other point of difference to the normal ones. A pyrenoid and a limited number of starch-grains are generally present, but the pyrenoid does not appear to be quite constant. The cell-wall is generally thin.

* Named after the collector, Dr. Koettlitz, surgeon to the 'Discovery.'

In view of the method of reproduction above described, this species should perhaps be referred to the genus *Chlorella;* it shows some resemblance to species like *Chlorella conglomerata* (Artari) Oltmanns (=*Pleurococcus conglomeratus* Artari) and *C. regularis* (Artari) Oltmanns (=*P. regularis* Artari).

10. Pleurococcus dissectus.

Pleurococcus dissectus (Kütz.) Nägeli, Gatt. einzell. Algen (1849), p. 65, Tab. IV., E, fig. 3.

Hab.—Freshwater pond upon ice among eskers, four miles north of Black Island, McMurdo Strait, September 12th, 1902; Gap pond, Winter Harbour, December 15th, 1903.

Isolated cells or flat strata on the surface of *Phormidium*, as recorded by Messrs. West (*op. cit.*, p. 277).*

PRASIOLACEÆ.

Genus Prasiola Ag.

11. Prasiola crispa.

(Text-figures A–D.)

Prasiola crispa (Lightf.) Menegh.; Kützing, Phycol. gener. (1843), p. 295; Rabenhorst, Flor. europ. algarum, iii. (1868), p. 308.

Hab.—Damp spot, summit of Cape Adare (1000 feet), January 9th, 1902; under boulder, fifty feet above sea, Cape Adare, January 9th, 1902; probable developmental stages common among the Cyanophyceous sheets from the Gap pond, Winter Harbour, etc.

There can be no doubt that this is a common form in Antarctic regions (previously recorded by Hooker and Harvey, Wille, Fritsch, W. and G. S. West, etc.), as the frequency of the characteristic packets of cells throughout the material demonstrates. The only mature thalli were obtained from the summit of Cape Adare, while the material from beneath a boulder fifty feet above sea-level at the same locality consisted almost entirely of the *Hormidium*-stage.

The expanded thalli were irregularly folded and bullate, the cells showing ordinarily a very regular arrangement in groups of 16 or 32, separated by slightly wider interspaces (text-figure B). The dimensions of the cell-contents were $6–7 \cdot 5\ \mu \times 4–5\ \mu$ in surface view and $11\ \mu$ deep in section. At other points in the thalli, where a formation of the cell-packets serving for reproduction was taking place, the arrangement becomes far more irregular, the characteristic grouping being sometimes almost completely lost. As stated in an earlier paper (Fritsch, *op. cit.*, p. 331), this

* A form resembling *Protoderma* was observed on the *Phormidium*-sheets in one of the samples from the Gap pond, Winter Harbour, but too little of it was seen to admit of determination.

production of packets for purposes of propagation is not confined to the margin of the thallus, as Wille (Nyt Mag. f. Naturvidenskab, xl., 1902, p. 215) describes it, but can take place anywhere.

In the above-mentioned paper of Wille's a number of reproductive stages of another kind are described and figured (*op. cit.*, p. 216, Tab. III., figs. 13–19); these are supposed to be the products of unicellular akinetes produced from the margins of the thallus (*cf.* Gay, Recherches sur le développement et la classification de quelques Algues vertes, Paris, 1891, fig. 130). Stages like those shown in Wille's figs. 13–15 were common not only in the material from Cape Adare, but more or less isolated among other Algæ from several other localities (notably from the Gap pond). There can be no doubt that these stages arise from large unicellular akinetes, as such were frequently observed in the mature thalli (text-figure A, *k*). These akinetes are however by no means confined to the margin of the thalli, but can arise anywhere. They are generally more or less separated from one another, the surrounding cells being often quite irregularly arranged, pale in colour and apparently in a moribund condition (text-figure A). The akinetes are spherical and vary in diameter between 10 and 14 μ; they have a thick membrane. Division of the contents of the akinete (text-figures C and D) does not appear to take place until it is liberated by the decay of the surrounding thallus, but there may be exceptions to this rule.

I have no doubt that Wille is right in regarding these cells as sporangial, as the irregularity of arrangement of the products of their division excludes the possibility of their being the beginnings of a new thallus. Wille thinks that the products (his aplanospores) on liberation give rise to the *Hormidium*-stage. While this may frequently be the case, there seems to be indirect evidence that they may sometimes give rise straight away to the characteristic *Prasiola*-packets. The abundance of such packets on the *Phormidium*-sheets from many localities is scarcely explicable on any other hypothesis. There are no mature *Prasiola*-thalli, from which these packets could have been derived, at hand in these localities, whereas the dividing akinetes are not uncommon.

The filaments of the *Hormidium*-stage from Cape Adare measured 9–11 μ in diameter.

12. Prasiola antarctica.

(Text-figures E and F.)

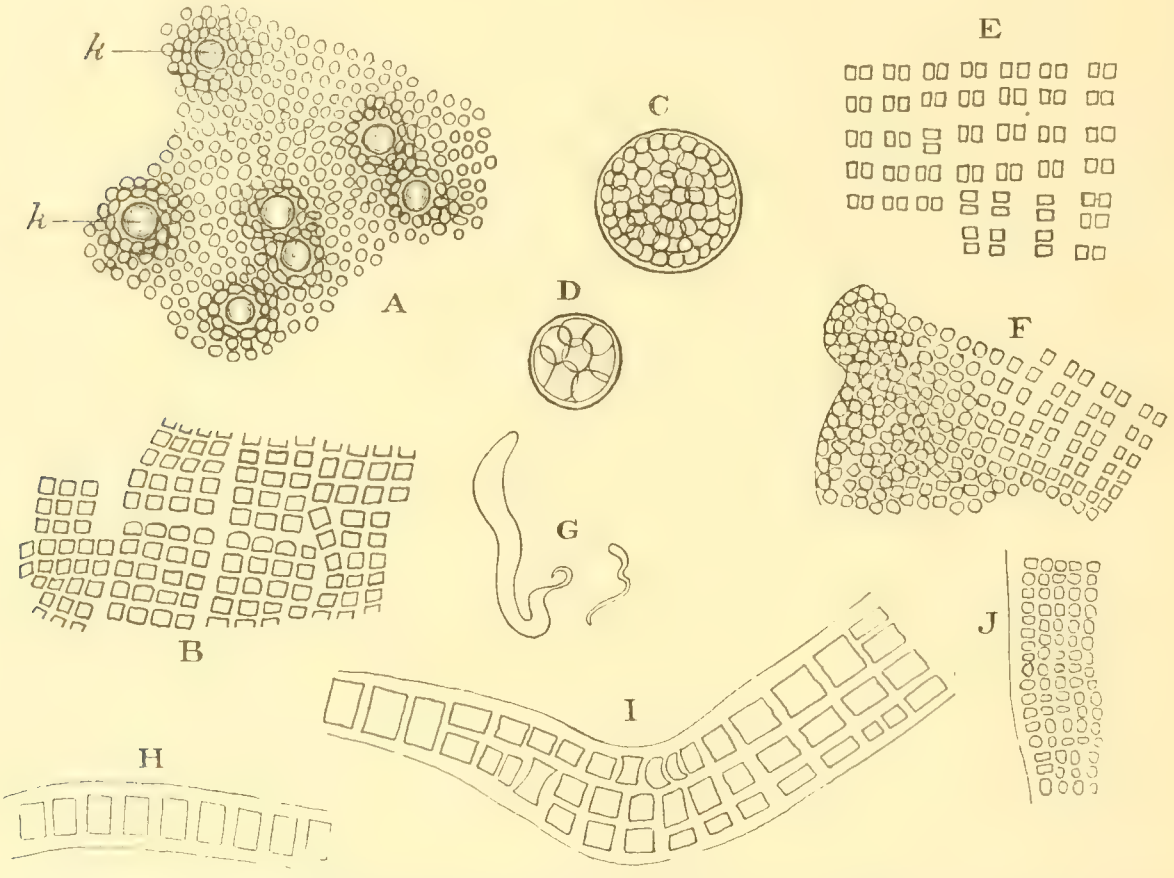
Prasiola antarctica Kütz., Spec. Alg. (1849), p. 473; Tabul. Phycol., v., Tab. 40, fig. 4; Rabenhorst, *op. cit.*, iii. (1868), p. 311.

Hab.—Growing on stones, Mt. Terror, January 22nd, 1902.

It is with some degree of diffidence that I refer the form from Mt. Terror to a species distinct from *P. crispa*, as I do not feel quite convinced that the differences are of specific value. *P. antarctica* might perhaps be regarded merely as a variety of *P. crispa*, as I advocated in my paper on the Algae of the

South Orkneys (*op. cit.*, p. 330). There is undoubtedly some variation in the degree of separation of the cells in *P. crispa*, although it does not appear ever to attain to the pronounced separation typical of *P. antarctica*. Since seeing the typical form of the latter species in the present material, I have realised that it was not present in the South Orkneys material at all.

The most pronounced difference between *P. antartica* and *P. crispa* lies in the thickness of the walls separating adjacent cells. In *P. antarctica* their thickness is generally nearly equal to the width of the cell-contents, so that the latter



A–D. *Prasiola crispa* (Lightf.) Menegh.; A, part of thallus showing formation of akinetes (*k*); B, a normal piece of the thallus; C and D, stages in the germination of akinetes; E, F, *Prasiola antarctica* Kütz.; E, normal piece of the thallus; F, edge of thallus, showing commencing formation of packets; G–J, *Prasiola calophylla* Kütz.; G, two plants; H, small part of stalk; I, broadening out of stalk into lamina; J, edge of broad part of lamina. (G, magnified about 5 times; C and D, × 700; all other figs., × 500.)

appear remote from one another (text-figure E). The arrangement of the cells in groups separated by wide interspaces is thereby rendered far less distinct, and in parts of the thalli from Mt. Terror was quite unrecognisable. As a consequence the thalli present an even more uniform appearance under the microscope than obtains in *P. crispa*. In the material from Mt. Terror there also appeared to be a tendency for the cells to be squarer in surface-view than is usually the case in *P. crispa*. The margins of the thalli were not as irregular as in the latter species, and the size of the whole plant was appreciably less; some of the thalli in my

material were however considerably larger than those figured by Messrs. West (*op. cit.*, Pl. XXIV., fig. 10). We may add to the differences between the two forms the habitat on moist stones, which has already been commented upon by J. G. Agardh, De Toni and Messrs. West.

The greatest difficulty in the way of regarding *P. antarctica* as a species distinct from *P. crispa* is the absence of all indications of a separate course of reproduction in the former. Abundant reproduction by the characteristic packets of cells was going on in the material from Mt. Terror, but, except that the production of the packets in this case was certainly confined to the margins of the thallus (text-figure F), there was nothing to distinguish them from those of *P. crispa*. For this reason I think it may ultimately appear that *P. antarctica* is only a variety of *P. crispa*, although one cannot agree with Wille (*op. cit.*, p. 218) that the two forms are identical.

13. Prasiola calophylla.

(Text-figures G–J.)

Prasiola calophylla (Carm.) Menegh.; Rabenhorst, *op. cit.*, pp. 310–311; De Toni, Sylloge Algarum, i. (1889), p. 144.

Hab.—Attached to rocks, freshwater pond in gap, Winter Harbour, January 12th, 1904; attached to stones, Granite Harbour, January 20th, 1902.

This form was markedly distinct from the two previous ones in the thread-like form of the thalli and in being firmly attached to the rocks by a long filiform stipe; this slowly widens (consisting at first of one, then of two and then of four longitudinal rows of cells) into a fairly broad thallus (25 or more rows of cells wide), which is in no way sharply demarcated from the stalk. A number of thalli arose from the same point, appearing to the naked eye like a bunch of coarse filaments (text-figure G).

The base of the stalk is slightly enlarged to form an organ of attachment. The cells of the stalk are prominently flattened and have thick walls (diam. stalk = 20 μ; diam. cell-contents = 9–11 μ; long. cell-contents = 3–5 μ), but the longitudinal walls are thicker than the transverse ones (text-figure H). Here and there longitudinal division takes place in the cells of the stalk, so that two rows of cells are present, but such divisions are merely local (leading to slight bulgings of the stalk) and generally only extend to a few cells, beyond which the stalk again consists of a single row. It is only at a considerable distance from the point of attachment that the stalk becomes permanently biseriate (text-figure I), and this condition may again persist for some distance before further longitudinal divisions take place and a quadriseriate arrangement is attained. After this, longitudinal walls appear to be formed more frequently and the stipe rather rapidly broadens out into the flat thallus. Even after the bi- or quadri-seriate condition is arrived at, there may often be local reversions to a uni- or

biseriate arrangement. The same thing may more rarely take place in the expanded part of the thallus, which occasionally exhibits prominent constrictions. In spite of all these irregularities there is a very sensible and gradual widening of the plant after the first permanent longitudinal divisions set in.

In many of the plants the broadening out of the thallus did not go very far, so that the whole plant had a filiform appearance, with a length many times exceeding its breadth. This, and the very gradual widening of the stipe into the thallus, appear, according to Imhäuser ("Entwicklungsgesch. u. Formenkreis v. *Prasiola*" Flora, 1889, Heft 3, Diss. Marburg, 1889, pp. 47 and 55) to be the two most prominent characteristics of the species. These two characters are also well shown in exsiccata of *P. calophylla* (from Tristan d'Acunha, Hb. Dickie) preserved in the British Museum, although the specimens are not as elongated as those from Winter Harbour.

In the expanded thallus (text-figure J) it was often not easy to recognise the longitudinal seriation of the cells, referred to in many descriptions of the species (Imhäuser, *op. cit.*; De Toni, *op. cit.*; Rabenhorst, *op. cit.*; F. S. Collins, "Green Algæ of N. America," Tuft's College Studies, Scient. series, II., No. 3, 1909, p. 219). The cells were regularly arranged in groups of four and were often practically equidistant, so that an areolation, such as that in *P. crispa*, was not manifest; but this grouping of the cells was frequently interrupted owing to the cells in adjacent parts of the thallus showing a slightly different orientation. The cells in the expanded thallus were often almost square, the cell-contents measuring 5–6 × 5–6 μ.

Some of the larger thalli attained a length of 2 cm. and a breadth of about a millimetre (at their widest point). The specimens from Granite Harbour were much shorter than those from the other habitat.

No reproductive stages were observed, but intermingled with the other growth on the stones from Winter Harbour were *Prasiola*-packets, which did not differ in any respect from those of *P. crispa*. Presumably they belonged to *P. calophylla*.

CONJUGATÆ.

MESOTÆNIACEÆ.

Genus Penium Bréb.

14. Penium sp.

(Pl. I., figs. 45, 46.)

Cellulis subcylindricis vel modice ellipsoideis, latitudine circa duplo longioribus, polis rotundato-deplanatis, constrictione modica in media parte cellulæ munitis; membrana cellulæ lævis et hyalina, modice sed æqualiter incrassata; contentu

cellularum contracto, cum pyrenoide magno globoso in utraque parte cellulæ; chromatophoram non vidi.

Long. cell. = 35 μ; lat. cell. = 16 μ.

Hab.—Isolated among sediment from freshwater ponds, Granite Harbour, January 20th, 1902.

The discovery of this Desmid is of great interest, as it indicates that the group is not quite unrepresented, even in these extreme southern latitudes. It may well be that the form just described is new, but the material was too scanty and the cell-contents too badly preserved to warrant the establishment of a new species. The cells appear elliptical in shape and have somewhat flat rounded ends. There is a slight constriction in the middle of the cell, as in many species of the genus. The specimens show considerable resemblance to *P. cruciferum* (De Bary) Wittr. (*cf.* W. and G. S. West, A monograph of the British Desmidiaceæ, Ray Society, 1904, Vol. I., p. 100, Pl. X., figs. 18, 19), but the shape of the cell is rather different. The contents were contracted in all the individuals seen, and no details of the chloroplast could be made out; each half of the cell however has a large circular pyrenoid. In many cases the contents showed a faint constriction similar to that of the cell-wall.

CYANOPHYCEÆ (MYXOPHYCEÆ).

CHROOCOCCACEÆ.

Genus Chroococcus Nägeli.

15. Chroococcus turgidus.

Chroococcus turgidus (Kütz.) Näg., Gatt. einzell. Alg. (1849), p. 46.

Diam. cell. = 13–14 μ.

Hab.—Gap pond, Winter Harbour, February 20th, 1904 (on *Phormidium*).

The sheath was plainly stratified, thus distinguishing this form from *C. minutus*, which was much more abundant.

16. Chroococcus minutus.

Chroococcus minutus (Kütz.) Näg., *op. cit.*, p. 46; Rabenhorst, Fl. Europ. Alg., ii. (1865), p. 30.

Diam. cell. = 8–11 μ or sometimes even 13 μ.

Hab.—Abundant on the surface of *Phormidium* in some of the material from the Gap pond, Winter Harbour.

These specimens, like those recorded by Messrs. West (*op. cit.*, p. 297) are larger than the normal; the cells were often grouped to form colonies of appreciable size.

17. Chroococcus minor.

Chroococcus minor (Kütz.) Näg., *op. cit.*, p. 47, Tab. I., fig. A4 ; Rabenhorst, *op. cit.*, p. 30.

Hab.—Gap pond, Winter Harbour, December 15th, 1903 (on *Phormidium*).

18. Chroococcus helveticus.

Chroococcus helveticus Näg., *op. cit.*, p. 46, Tab. I., fig. A3 ; Rabenhorst, *op. cit.*, p. 31.

Diam. cell. = 5 μ.

Hab.—Gap pond, Winter Harbour, December 15th, 1903 (on *Phormidium*).

Very typical colonies of exactly spherical cells ; colonies composed of 4–8–16 cells.

Genus Dactylococcopsis Hansg.

19. Dactylococcopis rhaphidioides.

(Pl. II., figs. 116, 117.)

Dactylococcopsis rhaphidioides Hansg., Prodr. d. Algenfl. v. Böhmen, ii. (1892), p. 139, fig. 49*a*.

Diam. cell. in media parte = 2–3 μ ; long. cell. = 25–27 μ.

Hab.—Freshwater pond upon ice among eskers, four miles north of Black Island, McMurdo Strait, September 12th, 1902.

The individuals were slightly longer than those described by Hansgirg, and were all of semilunar shape ; the contents were pale blue-green, with a few small granules, and pronouncedly vacuolar ; the ends of the cells were pointed and colourless. Some of the cells showed a distinct septum across their middle.

20. Dactylococcopsis antarctica sp. n.

(Pl. II., figs. 121, 122.)

Cellulis minutis, numerosis in muco hyalino nidulantibus, stratum planum in superficiem algarum Cyanophycearum formantibus ; cellulis irregulariter dispositis, fusiformibus vel in alterutro fine rotundatis, rarius leniter curvatis, contentu dilute ærugineo cum granulis paucis, membrana tenui ; propagatio divisione paulo obliqua fit.

Diam. cell. = 1·5–2 μ ; long. cell. = 4–6 μ.

Hab.—Forming an extensive flat stratum on the surface of the thallus of *Nostoc commune*, Granite Harbour, New Bay, January 20th, 1902.

The cells of this minute species are in the majority of cases spindle-shaped ; in occasional cells however one end is rounded or one side may be almost flat. Curved cells are rare. The ends of the cells are not protruded in any way and are not colourless.

In its habitat *D. antarctica* resembles *D. mucicola* F. Hustedt (Hedwigia, XLVIII., pp. 140–141), which also grows in the mucilage of a *Nostoc*, but Hustedt's species is a much larger form with curved cells, having marked attenuated apices. The Antarctic form is much nearer to *D. montana* W. and G. S. West; the cells of this species are however appreciably larger, are more pronouncedly spindle-shaped, and the species is not endophytic. The cells in *D. montana* also appear to be more regularly arranged than in *D. antarctica* (*cf.* G. S. West, Brit. Freshw. Algæ (1904), p. 348, fig. 162A).

A form like *D. antarctica* approaches very near to an *Aphanothece*.

Genus Glœocapsa Kütz.

21. Glœocapsa rupicola.

Glœocapsa rupicola Kütz., Spec. Alg. (1849), p. 221; Rabenhorst, Fl. Europ. Alg., ii. (1865), p. 43.

Diam. cell. = 4–5 μ; diam. colon. usque ad 30 μ.

Hab.—Gap pond, Winter Harbour, December 15th, 1903 (on surface of *Phormidium*); freshwater pond, Granite Harbour, January 20th, 1902 (in sediment).

The small colonies were spherical or elliptical. The inner sheaths were deep red-brown, often almost completely obscuring the cells. A closely allied species (*G. shuttleworthiana* Kütz.) is recorded by Messrs. West (*op. cit.*, p. 296).

Genus Aphanothece Nägeli.

22. Aphanothece prasina.

Aphanothece prasina A. Braun in Rabenh. Alg. No. 1572; Rabenhorst, Fl. Europ. Alg., ii. (1865), pp. 65–66.

Hab.—Ice-wall, five feet above present level of river-like pond, "Penknife ice," McMurdo Strait, September 13th, 1902.

Small, but otherwise typical colonies, attached to *Phormidium glaciale*. This species is generally free-floating.

Genus Microcystis Kützing.

23. Microcystis chroococcoidea.

(Pl. II., figs. 102, 103.)

Microcystis chroococcoidea W. and G. S. West, *op. cit.*, p. 296, Pl. XXVI., figs. 107–114.

Diam. cell. = 4 μ.

Hab.—Gap pond, Winter Harbour, December 15th, 1903.

Occasional colonies of this interesting form were found on the *Phormidium*-sheets from the above-mentioned locality. They agreed well with the description published by Messrs. West, except that the cell-contents appeared homogeneous.

24. Microcystis marginata.

Microcystis marginata (Menegh.) Kütz., Tab. Phyc., i. (1846), Tab. 8.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (free-floating); attached to *Prasiola calophylla*, freshwater pond in gap, Winter Harbour, January 12th, 1904.

25. Microcystis merismopedioides.

Microcystis merismopedioides F. E. Fritsch, Freshw. Alg. coll. in the South Orkneys, etc., Journ. Linn. Soc., Bot., xl. (1912), p. 332, text-fig. *E*.

Hab.—Ice-wall, five feet above present level of river-like pond, "Penknife ice," McMurdo Strait, September 13th, 1902.

The colonies were loosely attached to the surface of *Phormidium glaciale*, and differed in no respect from those previously described. The general investment was of a bright yellowish-red hue.

26. Microcystis parasitica.

(Pl. I., figs. 67–70.)

Microcystis parasitica Kütz., Phyc. generalis, 1843, p. 170; Phyc. German., 1845, p. 148; Tab. Phyc., i. (1846), Tab. IX.; Migula, Kryptogamenfl. von Deutschland, Deutsch-Österreich und d. Schweiz, ii., 1 (1907), p. 36.

Anacystis parasitica Kütz., Spec. Alg., 1849, p. 209.

Microhaloa firma Bréb.; Kütz., Tab. Phyc., i. (1846), Tab. VII.; Spec. Alg. (1849), p. 207.

Polycystis firma (Bréb. et Lenorm.) Rabenh., Fl. Europ. Alg., ii. (1865), p. 53.

Microcystis firma (Bréb. et Lenorm.) Migula, *op. cit.*, p. 37.

Hab.—Ice-wall, five feet above present level of river-like pond, "Penknife ice," McMurdo Strait, September 13th, 1902; freshwater pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903; Gap pond and other pools, Winter Harbour.

This form was very abundant on some of the *Phormidium*-sheets from the localities above-mentioned, and in several cases was found in large quantities on the surface of aquatic micro-animals. The colonies varied very considerably in size (15–40 μ) and were composed of numerous minute rounded cells, rarely exceeding 1 μ in diameter. The shape of the colonies was very diverse; in many cases they were more or less rounded and well defined (fig. 68), but in other cases the shape was quite irregular (figs. 67, 70). These differences are not due to a difference in age, as large colonies were often round and small ones quite irregular. The cells are, as a general rule, very closely crowded, although in the more irregular colonies they tend to be less densely placed at some points. The colour of the cell-contents varies from a pale blue-green to a dark green. The colonies could in all cases be made to stand out conspicuously against the background of the *Phormidium* by treatment with iodine, which gave them a yellowish-brown tinge.

It does not seem possible to distinguish adequately between Kützing's *Microcystis parasitica* and his *Microhaloa firma* (= *Microcystis firma*). The colonies observed in the present material really combine the characters of the two species.

Var. GLACIALIS var. nov.

Cellulis minutissimis, dense aggregatis in familiis plerumque et saepe valde irregularibus, in muco rubiginoso involutis; contentum cellularum dilute ærugineum esse verisimile est.

Diam. cell. = ·5 μ; diam. colon. usque ad 40 μ.

Hab.—Dull brick-coloured ice, situated in long level line as though in situation of former water-level, four feet above frozen water-course through "Penknife" ice, McMurdo Bay, September 13th, 1902.

This form is partly, if not entirely, responsible for the colouration of the ice in this habitat. The minute cells are densely aggregated in a brownish-red mucus, which seems to be the only essential point of difference from the type. As far as could be made out the cells themselves have pale blue-green contents.

Genus MERISMOPEDIA Meyen.

27. MERISMOPEDIA TENUISSIMA.

(Pl. I., figs. 49–51.)

Merismopedia tenuissima Lemmermann, Beitr. z. Kenntn. d. Planktonalgen, Bot. Centralbl., lxxvi. (1898), p. 154.

Diam. cell. ca. 1·5 μ.

Hab.—Damp spot, summit of Cape Adare, January 9th, 1902.

The colonies were composed of small, generally closely placed cells, and consisted of sixteen or frequently thirty-two or even sixty-four cells, forming very regular compact plates of small dimensions. The cell-contents were pale blue-green and homogeneous. Wille (Antarkt. Algen, Nyt Mag. f. Naturvidenskab, xl. (1902), p. 219) has recorded another form of this genus (*M. glaucum* (Ehrb.) Näg. var. *punctatum* (Meyen) Hansg.) from Cape Adare, but the cells in the colonies of my material were too minute to belong to this species; they differed also in their frequently dense aggregation.

Genus EUCAPSIS Clements and Shantz.

28. EUCAPSIS MINUTA sp. n.

(Pl. I., figs. 47, 48.)

Familiis sæpe irregularibus, sed e fasciculis cubicis 8–32–128 vel plurium cellularum compositis, libere natantibus, cum tegumento hyalino mucoso arcto; cellulis hemisphæricis vel subglobosis, geminatim dispositis ut in genere *Chroococco*, cytoplasmate plerumque dilute ærugineo (præsertim in familiis novellis), sed interdum

lacte ærugineo, homogeneo; cellulis in familiis novellis minutissimis et dense aggregatis, in familiis vetustis 1–1·5 μ diam. et distincte discretis; cellularum divisio fit in tres directiones alternantes.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902; in freshwater ice under boulder, Cape Adare, January 9th, 1902.

The genus *Eucapsis* was founded by Clements and Shantz (Minnesota Bot. Studies, iv. (1909), p. 134) for a species of blue-green Alga forming cubical packets of cells in an alpine pond in Colorado. The Antarctic species differs from it in the much smaller dimensions of the cells, in their wider separation in the mature condition, and in the frequent irregularity of the colonies. The latter do not form the regular cubical groups figured by the authors for *E. alpina*, but are (especially the older ones) of irregular outline (fig. 47), although composed of individual packets of eight or more cells, which are quite regularly disposed. The investment is quite invisible in unstained material, but is rendered obvious by treatment with methylene blue; it closely follows the outline of the colony.

OSCILLATORIACEÆ.

Genus Microcoleus Desmazières.

29. Microcoleus vaginatus.

Microcoleus vaginatus (Vauch.) Gomont, Monogr. d. Oscill., Ann. Sci. Nat., Bot., 7 sér., xv. (1892), pp. 355–357, Pl. XIV., fig. 12.

Hab.—Granite Harbour, January 20th, 1902 (rare).

Genus Symploca Kütz.

30. Symploca sp.

Hab.—On rocks, freshwater pond, Winter Harbour, January 12th, 1904.

Only one specimen of this form was found and that proved insufficient for determination. It appeared in the shape of very minute dense deep blue-green tufts, not more than 30 μ high and composed of very narrow and closely placed filaments. It may have been a specimen of *S. thermalis* (Kütz.) Gom.

Genus Lyngbya C. Agardh.

31. Lyngbya aestuarii.

Lyngbya æstuarii (Mertens) Liebm.; Gomont, *op. cit.*, xvi. (1892), pp. 127–131, Pl. III., figs. 1 and 2.

Diam. fil. = 8–15 μ; diam. trich. = 7–12 μ.

Hab.—Gap pond, Winter Harbour, February 20th, 1904; dry ponds, Winter Quarters, February, 1902.

The sheath was thick, stratified and provided with a rough edge.

Var. ANTARCTICA var. nov.

(Pl. II., figs. 87–90.)

Filis elongatis, rectis vel flexuosis, interdum tortuosis; vaginis hyalinis, plus minusve tenuibus, levibus, ut videtur, ætate provecta non crassis; trichomatibus ærugineis, apice haud vel raro attenuato, truncato, sæpe massa intercellulari inflato et refringenti interruptis; cellulis diametro trichomatis quadruplo ad sextuplo brevioribus, cytoplasmate sæpe cum granulis magnis, dissepimentis plerumque non granulatis; apice trichomatis interdum capitato, membrana cellulæ apicalis superne plus minusve distincte incrassata in forma calyptræ.

Diam. fil. = 8–13 μ; diam. trich. = 7–12 μ.

Hab.—Same as the type, but the variety was considerably more abundant.

At first there seemed to be good grounds for establishing this variety as a distinct species, as it differs from the type in several prominent respects, viz., the thin character of the sheath, even in older filaments; the rare attenuation of the apex of the trichome; the frequent presence of a prominent calyptra and the marked capitate habit of many of the trichomes; the presence of numerous biconcave masses of refringent intercellular substance, which generally bulge a little. None of these characters except the thinness of the sheath and the occurrence of intercellular masses is, however, constant. The apex of the trichome may be flat and rounded without any development of a calyptra or even a perceptible thickening of the outer membrane (fig. 88); or the apical cell may have a prominent calyptra without possessing a capitate character (fig. 89); or the apex may be distinctly capitate with only a slight thickening of the outer membrane (fig. 90); or lastly the apex of the trichome may be more or less markedly attenuated, capitate and provided with a well-marked calyptra (fig 87). It is obvious that these different forms of apex connect the variety with the type, a connection which is also established by the identical width of the trichomes in the two cases and the extremely flat cells. Should the different types of apex be constant we would have f. *attenuata*, f. *capitata*, f. *simplex*, etc., of this variety, but it is possible that some or all of them are merely stages in development.

The apical cell in the capitate trichomes was always very transparent and devoid of contents. Occasionally the two end-cells of the trichome showed these characters. In a few cases the cells near the apex of the trichome exhibited a faint constriction at the dissepiments (fig. 89).

32. LYNGBYA MARTENSIANA.

Lyngbya martensiana Menegh., Conspect. Algol. euganeæ, 1837, p. 12; Gomont, *op. cit.*, xvi. (1892), p. 145, Pl. III., fig. 17.

Diam. fil. = 8–9 μ; diam. trich. = 6–7·5 μ.

Hab.—Freshwater pond in ice off Black Island, McMurdo Strait, December 31st, 1902; Granite Harbour, January 20th, 1902.

33. Lyngbya attenuata sp. n.

(Pl. II., figs. 79–84.)

Filis stratum definitum non formantibus, sed numerosis ad superficiem stratuum *Phormidii* affixis vel repentibus, flexuosis, fragilibus; vaginis achrois firmis tenuibus; trichomatibus inter cellulas haud constrictis, cellulis tam longis quam latis vel paulo brevioribus, cytoplasmate homogeneo dilute æruginco, dissepimentis pellucidis, valde indistinctis; apice trichomatis plus minusve distincte attenuato, plerumque rotundato, interdum paulo capitato, sæpe modice arcuato.

Diam. fil. = 5–6 μ; diam. trich. = 4·8–5·7 μ.

Hab.—Pond in ice off Black Island, McMurdo Strait, December 31st, 1902; Gap pond, Winter Harbour; pond among the eskers which border the shore of the Western mainland, December 2nd, 1902.

The most distinctive character of this species lies in the marked attenuation of the apex (figs. 79, 80), the terminal cell being sometimes somewhat inflated and making the trichome capitate (figs. 82, 83); as a general rule the attenuated apex is rounded, but occasionally the terminal cell is more or less pointed (figs. 81, 84). Iodine coloured the filaments a deep yellowish-brown, but left the apical cell colourless.

L. attenuata appears to come nearest to *L. æruginco-cærulea* (Kütz.) Gom., from which it differs in the following respects: the frequent curvature of the apex of the trichome; the rather longer cells; the homogeneous cell-contents and the absence of granules at the dissepiments; the generally marked attenuation of the end of the trichome, often beginning at some distance from the apex; the absence of special thickening of the outer membrane of the apical cell; the very indistinct septa. *L. cladophoræ* Tilden (Minnesota Algae, I., Minneapolis (1910), p. 116, Pl. V., fig. 34) should also be compared.

34. Lyngbya æruginco-cœrulea.

(Pl. II., figs. 85–86.)

Lyngbya æruginco-cærulea (Kütz.) Gom., *tom. cit.*, pp. 146–147, Pl. IV., figs. 1–3.

Hab.—Abundant in Gap pond, Winter Harbour, on the surface of the *Phormidium*-sheets, where it often formed an appreciable stratum.

In some cases the cell-contents were provided with abundant coarse granules (fig. 85), in others some of the dissepiments were very markedly granulated (fig. 85A). In several of the samples from the Gap pond the filaments of this species were forming gonidia, a single round gonidium being observed in each cell (fig. 86).

35. Lyngbya scotti * sp. n.

(Pl. II., figs. 91–93.)

Filis angustis, plerumque valde tortuosis, interdum subrectis, stratum in superficie *Phormidii* formantibus; vaginis primo tenuibus hyalinis, demum modice incrassatis extus rugosis cum particulis numerosis adhærentibus, non lamellatis; trichomatibus cum cellula apicali acuta conica, non capitatis aut attenuatis, plerumque modice inter cellulas constrictis; cellulis tam longis quam latis vel paulo longioribus, plerumque cytoplasmate homogeneo, dissepimentis indistinctis, sed interdum cum granulis dense aggregatis in utraque parte dissepimentarum; calyptra nulla.

Diam. fil. = 3·4–5 μ; diam. trich. = 2·6–3 μ.

Hab.—Granite Harbour, January 20th, 1902.

This species should be compared with *Lyngbya kützingi* Schmidle, and its variety *distincta* (Nordst.) Lemm. (= *L. subtilis* West). It differs from these forms in the thickened rugose sheath of older filaments, in the acutely conical apical cell, the slight constriction between the cells and the occasional granulation of the dissepiments. The adhesion of small particles to the rough surface of older sheaths is a marked characteristic, as the bulk of the filaments showed it.

Var. minor var. nov. (Pl. II., figs. 94–96).

Filis angustioribus, plerumque valde tortuosis; vaginis tenuibus hyalinis; trichomatibus cum cellula apicali acuta conica, interdum paulo attenuatis, modice inter cellulas constrictis; cellulis tam longis quam latis vel paulo longioribus, contentu homogeneo.

Diam. fil. = 2·5–2·7 μ; diam. trich. = 1·5–1·8 μ.

Hab.—Gap pond, Winter Harbour, February 20th, 1904 (forming a stratum on *Phormidium*).

This variety differs chiefly from the type in its smaller dimensions and in the apparent absence of thickening of the sheath in older filaments. The cell-contents were in all cases homogeneous.

36. Lyngbya lagerheimi.

(Pl. II., figs. 74–78.)

Lyngbya lagerheimii (Möb.) Gomont, *tom. cit.*, pp. 147–148, Pl. IV., figs. 6, 7 (*Spirocoleus lagerheimii* Möbius, Hedwigia, 1889, p. 312, Tab. 10, figs. 1, 2).

Diam. fil. = 3–3·5 μ; diam. trich. = 2–3 μ.

Hab.—Freshwater pond in eskers upon ice, halfway between Black Island and Brown Island, January 3rd, 1903.

* This species is named after Captain Scott, C.V.O., the leader of the British National Antarctic Expedition [and of the British Antarctic Expedition, 1910].

This Alga, about the determination of which I am not quite certain, formed a stratum together with *Phormidium angustissimum* W. and G. S. West. The filaments were very densely and irregularly entangled, and many of them showed a complete spiral coiling of several turns (figs. 74, 75); others, however, were merely flexuous or even straight for a considerable distance, such filaments being on the whole in the majority. The sheath was prominent, mostly fitting very close, although occasionally a little off-standing. The cell-contents were pale blue-green and often vacuolar or provided with scattered granules of moderate size. In no case could a regular placing of granules with reference to the septa be recognised. Gomont himself, however, queries this part of the diagnosis of *L. lagerheimi*, and his figures certainly fail to show anything of the kind. The cells of the trichomes were generally slightly longer than broad (fig. 78). The apex of the trichome appears to be rounded and obtuse.

Genus Phormidium Kütz.

37. Phormidium autumnale.

(Pl. I., figs. 53, 54.)

Phormidium autumnale (Ag.) Gom., *tom. cit.*, pp. 187–190, Pl. V., figs. 23, 24.

Diam. trich. = 3·8–4·5 μ; long. cell. = 3·8 μ.

Hab.—Freshwater pond, Granite Harbour, January 20th, 1902.

The cells were sometimes a trifle longer than broad; the septa were marked by a prominent double row of granules. The apex of the filament was not always prominently attenuated (fig. 53), but was markedly capitate, the apical cell being depressed-conical.

This species was not as abundant in my material as in that examined by Messrs. West (cf. *op. cit.*, p. 291); in the locality above named it, however, evidently formed extensive pure strata.

38. Phormidium laminosum.

Phormidium laminosum Gomont, Essai de classif. d. Nostoc. homocystées, Journ. de Bot., iv. (1890), p. 355; Monogr. Oscill., *tom. cit.*, pp. 167–168, Pl. IV., figs. 21, 22.

Diam. trich. = 1–1·5 μ; cellulis saepe elongatis (usque ad 5 μ).

Hab.—Gap pond, Winter Harbour.

The cells were frequently much elongated, but apart from that the specimens agreed well with Gomont's description. The inconspicuous septa were generally provided only with two granules, one on either side; according to Gomont there are four, but his figures fail to show more than two. The bulk of *Phormidium* from the Gap pond appears to belong to this species.

39. Phormidium tenue.

Phormidium tenue (Menegh.) Gom., *tom. cit.*, p. 169, Pl. IV., figs. 23–25.

Diam. fil. = 1·5–2 μ.

Hab.—Freshwater pond in ice off Black Island, McMurdo Strait, December 31st, 1902 (forming a thin stratum overgrown by *Nodularia koettlitzi* and species of *Oscillatoria*); Gap pond, Winter Harbour, December 15th, 1903.

The cell-contents were occasionally slightly granular.

40. Phormidium fragile.

Phormidium fragile (Menegh.) Gom., *tom. cit.*, pp. 163–164, Pl. IV., figs. 13–15.

Diam. trich. = 1·5–1·8 μ; long. cell. = 1·5–2 μ.

Hab.—Freshwater pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903; Gap pond, Winter Harbour; growing in and through ice in pond among the eskers which border the shore of the Western mainland, December 2nd, 1902.

41. Phormidium frigidum sp. n.

(Pl. I., fig. 52.)

Strato, ut videtur, tenui, membranaceo, colore? (ut videtur ærugineo); filis plerumque plus minusve tortuosis et intricatis, interdum parallelis; vaginis mucosis, in muco hyalino diffluentibus; trichomatibus inter cellulas distincte constrictis, sæpe fere moniliformibus, apice non attenuato, cellula apicali rotundata; cellulis tam longis quam latis vel ad duplo longioribus, cytoplasmate dilute ærugineo, homogeneo, rare granulato; dissepimentis plerumque cum granulo magno distincto sæpe deplanato in utraque parte, interdum modo in altera parte, vel sine granulis; calyptra nulla.

Diam. trich. = 0·8–1·2 μ (interdum ad 1·5 μ).

Hab.—Dull brick-coloured ice, situated in long level line, as though in situation of former water-level, four feet above frozen water-course through "Penknife ice," McMurdo Bay, September 13th, 1902.

This form, which presumably grows on the surface of the ice, was only present in minute pieces, so that the general colour of the stratum cannot definitely be stated. It belongs to Gomont's first section *Moniliformia*, but differs from all other species of that section in the frequent presence of granules at the dissepiments; although occasionally wanting, the granules were always present on the majority of the septa in each filament. The granules were generally more or less flattened against the dissepiments, which gives the trichomes a rather characteristic aspect (*cf.* the uppermost filament in fig. 52).

Except for the shortness of the cells and the granulated dissepiments the species resembles *P. angustissimum* W. and G. S. West. It also comes close to *P. fragile*

(Menegh.) Gom., but apart from other differences, the trichomes are more moniliform than they are in that species. The longer cells, granulated dissepiments and more markedly moniliform character distinguish *P. frigidum* from *P. glaciale* W. and G. S. West (*op. cit.*, p. 291, 292).

42. Phormidium angustissimum.

Phormidium angustissimum W. and G. S. West, "Welwitsch's African Freshwater Algae," Journ. Bot., 1897, pp. 298–299.

Hab.—Freshwater pond in eskers upon ice, half way between Black and Brown Islands, January 3rd, 1903; freshwater pond in ice off Black Island, McMurdo Strait, December 31st, 1902.

In the material from the first habitat the septa were very indistinct and constriction was scarcely obvious. In this latter respect the specimens were more like *P. treleasi* Gom., which G. S. West (Algæ from hot springs, Journ. Bot., 1902, p. 245) has suggested may be identical with *P. angustissimum*. In some cases the trichomes tapered a little at the apex. The material from the second habitat was quite typical.

43. Phormidium antarcticum.

(Pl. I., figs. 71–73.)

Phormidium antarcticum W. and G. S. West, Rep. Brit. Antarct. Exped., vol. i. (1911), p. 292, Pl. XXV., figs. 75A–75G.

Forma trichomatibus modo laxissime spiraliter contortis vel non spiraliter.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902.

The material of this species occurred intermingled with *Chlamydomonas subcaudata*, *C. intermedia*, etc., *i.e.* the consorts were in part the same, as in the material examined by Messrs. West. The filaments agreed in all respects with those described and figured by the latter authorities, except that they did not show the marked spiral character evident in Messrs. West's figures. They were sometimes formed into a very lax and irregular spiral, but more commonly a spiral character was not obvious at all, the filaments being almost straight or curved or looped in various ways.

The diffluent sheaths of the filaments were rarely visible, but were often indirectly rendered obvious by the marked adhesion of foreign matter (in the shape of minute particles) to the surface of the filaments. The transverse walls were very indistinct in unstained material, but after staining with methylene blue they appeared as rather thick transverse bars.

The advisability of referring this form to the genus *Phormidium* may be questioned. Except for the diffluent character of the sheaths, it is a *Lyngbya*, and it might prove better to confine the limits of the former genus to such forms as consist of sheets of agglutinated filaments.

Genus Oscillatoria Vaucher.

44. Oscillatoria proboscidea.

Oscillatoria proboscidea Gom., *tom. cit.*, p. 209, Pl. VI., figs. 10, 11.

Diam. trich. = 12 μ.

Hab.—Freshwater pond in ice off Black Island, McMurdo Strait, December 31st, 1902.

Isolated filaments, very similar to Gomont's fig. 11.

45. Oscillatoria subproboscidea.

(Pl. I., fig. 66.)

Oscillatoria subproboscidea W. and G. S. West, *op. cit.*, p. 293, Pl. XXV., figs. 91–94.

Hab.—Freshwater pond among eskers, four miles north of Black Island, upon ice, McMurdo Strait, September 12th, 1902; very rare.

46. Oscillatoria irrigua.

Oscillatoria irrigua Kütz., Phyc. gen. (1843), p. 189; Phycol. Germ., 1845, p. 160; Gomont, *tom. cit.*, pp. 218–219, Pl. VI., figs. 22, 23.

Diam. trich. = 7–8 μ.

Hab.—Gap pond, Winter Harbour, December 15th, 1903.

47. Oscillatoria simplicissima.

Var. antarctica var. n.

(Plate I., figs. 60–64.)

Oscillatoria simplicissima Gom., *tom. cit.*, p. 219, Pl. VII., fig. 1 (*O. tenuis* f. *æruginosa* Sauter in Rabenhorst, Alg., 1874, No. 2383).

Trichomatibus sæpe valde elongatis, flexilibus, plerumque flexuosis, inter cellulas non constrictis, massa intercellulari inflato et refringenti interruptis, apice recto neque attenuato neque capitato; cellula apicali superne hemisphærica; protoplasmate homogeneo vel subgranuloso.

Diam. trich. = 8 μ; long. cell. = 2–3 μ.

Hab.—Freshwater pond in ice off Black Island, McMurdo Strait, December 31st, 1902 (on surface of a sheet of *Phormidium angustissimum*); pond among the eskers which border the shore of the Western Mainland, December 2nd, 1902.

The specimens differed from those described by Gomont in two important respects, viz., their highly flexuous character and the abundant occurrence of inflated bi-concave intercellular masses (fig. 60). The apices of the trichomes were perfectly straight and in

no way attenuated; the apical cell was more or less hemispherical, its outer membrane being unthickened or barely thickened. The trichomes were frequently overgrown by filaments of the subjacent *Phormidium*, which were in part very closely applied to the *Oscillatoria* (fig. 64). Not uncommonly the apices of the trichomes bore a small cluster of Bacteria (fig. 63).

Apart from these typical specimens of the variety two peculiar forms were noticed. In the one the apical cell of the trichome is produced into a point (f. *acuminata*, fig. 62), although such cases were very rare. The other form is characterised by a tendency for the trichomes to coil up into a spiral or for two parts of a trichome to become twisted spirally around one another, somewhat as in *Spirulina duplex* Wolle (f. *spiralis*, *cf.* fig. 61).

48. Oscillatoria koettlitzi sp. n.

(Pl. I., figs. 55–59.)

Trichomatibus rectis vel modice flexuosis, sparsis in superficiem *Phormidii* repentibus, obscure violaceis, haud vel vix inter cellulas constrictis, 7–9 μ crassis; cellulis valde deplanatis, longitudine $1\frac{1}{2}$–2plo latioribus (long. cell. 3–4·5 μ), contentu cum paucis granulis, dissepimentis sæpe indistinctis, granulis protoplasmaticis sæpe magnis et fere confluentibus obductis; apice recto, non attenuato, plerumque distincte capitato; cellula apicali sæpe decolorata, sine granulis et plus minusve inflata, membrana superne interdum modice incrassata.

Hab.—Gap pond, Winter Harbour; dry ponds, Winter Quarters, February, 1902.

This species finds its place in Gomont's section *Principes* and is perhaps most nearly allied to *O. limosa* Ag., from which it differs in its smaller dimensions, in the capitate habit and in the absence of attenuation. The terminal cell is certainly a very characteristic feature; in many of the trichomes it is prominently inflated and quite devoid of contents, its membrane, however, being little if at all thickened (figs. 55, 57, 58). The septa are generally completely obscured by often coarse protoplasmic granules, which mostly form a dense double row on either side of the septum, although in some few cases there was but a single row of granules (fig. 57).

49. Oscillatoria tenuis.

Oscillatoria tenuis Agardh, Alg. Decades, ii. (1813), p. 25; Gomont, *tom. cit.*, pp. 220–221, Pl. VII., figs. 2 and 3.

Diam. trich. = 6–7 μ.

Hab.—Pond in eskers along shore of Western land, December 14th, 1902; pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903; pond in ice, off Black Island, McMurdo Strait, December 31st, 1902.

There was occasionally very little constriction between the cells. Some of the filaments bore apical bacterial clusters.

50. Oscillatoria formosa.

Oscillatoria formosa Bory, Dict. class. d'hist. nat., xii. (1827), p. 474; Gomont, *tom. cit.*, pp. 230–231, Pl. VII., fig. 16.

Diam. trich. = 5 μ.

Hab.—Damp spot, summit of Cape Adare, January 9th, 1902.

This form occurred in tufts attached to the surface of *Prasiola crispa*. The trichomes showed no indication of constriction at the dissepiments, but Gomont's figure also shows nothing of the kind. Although many of the trichomes were tapering and hooked, others in the same tuft were straight at the apex, not tapering and obtuse. The trichomes often exhibited a slight terebriform character (*cf.* O. Borge, Algen aus Argentina und Bolivia, Arkiv f. Botanik, VI., No. 4 (1906), p. 11).

51. Oscillatoria producta.

(Pl. I., fig. 65.)

Oscillatoria producta W. and G. S. West, *op. cit.*, p. 294, Pl. XXV., figs. 86–90.

Hab.—Freshwater pond among eskers, four miles north of Black Island, upon ice, McMurdo Strait, September 12th, 1902.

Only a few trichomes of this species were seen. They were quite straight with a straight tip, which was rather longer than shown in any of Messrs. West's figures (*cf.* fig. 65). The cell-contents were highly granular.

52. Oscillatoria brevis.

Oscillatoria brevis Kütz., Phyc. gen. (1843), p. 186; Gomont, *tom. cit.*, pp. 229–230, Pl. VII., figs. 14, 15.

Diam. trich. = 4–7 μ; cellulis diametro $\frac{1}{2}$–$\frac{1}{3}$plo longioribus.

Hab.—Freshwater pond among eskers, four miles north of Black Island, upon ice, McMurdo Strait, September 12th, 1902; pond among eskers, bordering shore of Western Mainland, December 2nd, 1902.

The trichomes were frequently interrupted by inflated masses of intercellular substance.

53. Oscillatoria deflexa.

Oscillatoria deflexa W. and G. S. West, *op. cit.*, p. 295, Pl. XXV., figs. 95–97.

Hab.—Freshwater pond in ice, off Black Island, McMurdo Strait, December 31st, 1902 (floating among *Nodularia koettlitzi* and *Oscillatoria tenuis*).

RIVULARIACEÆ.

Genus Calothrix Agardh.

54. Calothrix antarctica sp. n.

(Pl. III., figs. 161–163.)

Filis solitariis vel sparse congregatis, flexuosis, usque ad 300 μ longis, in stratu *Phormidii fragilis* nidulantibus; vaginis crassis, flavescentibus, indistincte lamellatis, non ocreatis, spatio parvo a trichomatibus sejunctis, sæpe apice diffluentibus; heterocystis basilaribus, solitariis vel rare duabus, plerumque non in vaginis inclusis, ellipticis vel plerumque deplanatis membrana crassa et contentu homogeneo, sæpe effetis; trichomatibus paulatim apicem versus attenuatis, ut videtur non in pilum productis, interdum pseudo-ramosis, inter cellulas plus minusve constrictis, dissepimentis indistinctis, sæpe granulatis; cellulis ad basim trichomatis modice deplanatis, sursum paulo longioribus quam latis, cytoplasmate cum paucis granulis magnis.

Diam. fil. ad bas. = 10–15 μ; diam. trich. ad bas. = 6–8 μ; diam. fil. in media parte = 8–13 μ; diam. trich. in media parte = 5–6 μ; diam. heterocyst. = 10 μ; crass. parietis vaginae = 2 μ.

Hab.—Freshwater pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903.

This species was relatively rare, but very distinct owing to the yellow colouration of the sheath; this is thick, faintly stratified and diffluent at the apex. It does not appear that the trichomes terminate in a hair, although I do not feel sure on this point. The trichomes showed no constriction at the base, but in the upper portions frequently appeared almost moniliform (fig. 162). The granulation of the dissepiments (figs. 161, 163) is not a common feature in the genus.

C. antarctica appears to be rather closely allied to *C. fusca* (Kütz.) Bornet et Flahault, but the latter differs in the bulbous inflation of the base of the filaments, the colourless gelatinous sheaths, the short cells and probably in the production of the trichomes into a long hair. The characters of the sheath also serve to distinguish this species from *C. sandvicensis* (Nordst.) Schmidle.

55. Calothrix intricata sp. n.

(Pl. III., figs. 158–160.)

Filis in stratu parvo membranaceo dispositis dense flexuoso-contortis et intricatis vel subsolitariis, subbrevibus, ut videtur usque ad 300 μ longis, ad superficiem *Phormidii* affixis; vaginis tenuibus, distinctis, achrois, non ocreatis, plerumque arctis, in basi interdum paulo inflatis; heterocystis basilaribus, singulis vel pluribus, plerumque in vaginis inclusis, plus minusve hemisphæricis vel deplanatis, contentu interdum

granuloso; trichomatibus gradatim attenuatis, sed non in pilum productis, non pseudo-ramosis, inter cellulas vix constrictis, dissepimentis distinctis; cellulis ad basin trichomatis tam longis quam latis vel modice deplanatis, sursum diametro ad duplo longioribus, contentu ærugineo granuloso.

Diam. fil. ad bas. = 8–9 μ; diam. trich. ad bas. = 5–6 μ; diam. trich. in media parte = 4–5 μ; diam. heterocyst. = 5–6 μ; crass. parietis vaginae = ·8 μ.

Hab.—Gap pond, Winter Harbour.

The filaments are curved and intertwined to such an extent as to make it almost impossible to follow one from end to end (fig. 158). In places these densely entangled filaments form a thin stratum completely hiding the underlying *Phormidium*, but at other points they are much more loosely arranged. The base of the sheath is often a little inflated, and in this case there is a rapid narrowing of the filament just above the base; beyond that point, however, the attenuation is very gradual, and the termination of the filament is only slightly narrower than it is just above the inflated base (figs. 159, 160). The terminal cell of the trichome appears to be more or less pointed and acute (figs. 159, 160).

This species bears considerable resemblance to the *Calothrix* sp., described and figured by Messrs. West (*op. cit.*, p. 298, Pl. XXV., figs. 55–57), which they regard as probably being a new species of the genus; but there are some important differences—viz. the subtorulose cells (which are quite different to those of *C. intricata*), and the obtuse terminal cell of the trichomes. Possibly Messrs. West's specimens are a variety of *C. intricata*. The genus *Calothrix* is, however, evidently well represented in the Antarctic with a considerable number of new forms.

There is some resemblance between *C. intricata* and *C. epiphytica* W. and G. S. West, but, apart from the somewhat larger dimensions, the former differs in the fact that the trichomes do not taper into a hair and in the highly tortuous character of the filaments.

56. Calothrix gracilis, sp. n.

(Pl. III., figs. 164–172.)

Filis rectis vel sæpe modice flexuosis, solitariis vel subgregariis, usque ad 400 μ longis, in superficie *Phormidii* repentibus, rare pseudo-ramosis; vaginis tenuissimis, hyalinis, arctis, basin interdum inflatis; heterocystis basilaribus, et in filis longioribus etiam intercalaribus, plerumque solitariis, in vaginis inclusis, deplanatis, hemisphæricis vel rarius obconicis, membrana modice incrassata contentu homogeneo; trichomatibus non in pilum productis, plerumque gradatim attenuatis, sed ubi basis vaginæ inflata est subito attenuatis paulum supra basim, cellula apicali acuta; trichomatibus in parte basali inter cellulas modice constrictis; cellulis inferne sæpe paulo deplanatis (præsertim ubi basis fili inflata est), in media parte et superne diametro circa 1½plo longioribus, contentu cum paucis granulis; sporis (an maturis?) binis (semper?), cylindricis, diametro 1½–2plo longioribus, membrana levi.

Diam. fil. ad bas. = 6 μ (fil. inflat. 9–10 μ); diam. trich. ad bas. = 5 μ (trich. inflat. 8–9 μ); diam. fil. in media parte = 3·5 μ; diam. trich. in media parte = 3 μ; diam. heterocyst. = 5·5 μ; diam. spor. = 5 μ; long. spor. = 8–9 μ.

Hab.—Gap pond, Winter Harbour, January 12th, 1904.

The often much elongated and rather narrow filaments of this species present a very graceful appearance under the microscope. In many cases there is quite a gradual attenuation from base to apex (figs. 165, 172), but occasional filaments show a prominent inflation of the base, as seen in fig. 166. False branching of the filaments is rare (fig. 164). The heterocysts are slightly wider than the trichomes and are only rarely found in an intercalary position (figs. 164, 170); their shape is remarkably diverse (figs. 165, 166, 171). Only one filament with spores was seen (fig. 168), and it is hardly likely that they were mature.

The species comes near to *C. sandvicensis* (Nordst.) Schmidle (= *Lophopodium sandvicense* Nordst.), a form which has as yet only been found in the Southern Hemisphere. *C. gracilis* differs from it in the different shape of the spores, in the absence of a hair-like termination to the trichome, in the simple sheath, and the diverse shape of the heterocysts. It also resembles *C. cartilaginea* G. S. West, superficially, but this species has no heterocysts and its trichomes are attenuated into hairs.

SCYTONEMATACEÆ.

Genus Tolypothrix Kütz.

57. Tolypothrix conglutinata.

(Pl. III., figs. 145, 146.)

Tolypothrix conglutinata Borzi, Note alla Morf. e Biol. d. Alghe Ficocrom., Nuov. Giorn. bot. Ital., xi. (1879), p. 371; Bornet et Flahault, Rev. d. Nostoc. hétérocyst., Ann. Sci. nat., Bot., 7 sér., v. (1887), p. 125.

Diam. fil. = 16–18 μ; diam. trich. = 8–9 μ; crass. parietis vaginæ = usque ad 5 μ.

Hab.—Freshwater pond, Granite Harbour, January 20th, 1902.

Unfortunately only a single specimen of this form was found, but that was fairly convincing. It formed an intricate mass of numerous branches, to which fig. 145 does no degree of justice, but it was impossible to figure the confused tangle in its entirety. The false branches were very numerous and followed closely upon one another. They were superposed to such an extent as to make their course very difficult to follow; in many cases they were sharply incurved and more or less agglutinated with the main filament and other branches. The filaments had very thick sheaths (up to 5 μ in thickness) with a rough edge, the sheaths being hyaline and not stratified (fig. 146). The cells of the trichomes were very flat (often 3–4 times as broad as long) with somewhat granular septa, the trichomes being slightly constricted between the

cells. The heterocysts were single and mostly almost spherical. The only point in the published descriptions of the species that could not be verified is the irregular widening of the sheaths and their occasional constriction ("vaginis irregulariter ampliatis hic et illic constrictis"). The dimensions agree well.

As far as I am aware this species has hitherto only been observed on wet rocks in Italy, by Borzi.

NOSTOCACEÆ.

Genus Nostoc Vaucher.

58. Nostoc disciforme sp. n.

(Pl. III., figs. 123–131.)

Thallo pallide æruginco, pellucido, deplanato, adnato vel postea libere natante, forma disci tenuis ovalis vel circularis cum margine levi et regulari, non confluentis et diametro usque ad 4 mm.; trichomatibus plus minusve laxe intricatis, valde tortuosis, vaginis arctis, hyalinis et modice inter cellulas constrictis, sæpe deficientibus; cellulis parvis, plerumque globosis, rarius paulo deplanatis et doliformibus, rarissime ellipsoideis, remotis; heterocystis globosis aut deplanatis aut doliformibus, singulis vel binis vel interdum pluribus congregatis, membrana modice incrassata et contentu distincto, diametro trichomatis circiter duplo latioribus; sporis depresso-globosis vel rarius globosis, confertis, in catenis dispositis, membrana levi et contentu paulo granuloso; thallus peridermate distincto, mucoso, tenui, sed modice tenaci, circumdatus est; thalli juvenales circulares sunt.

Diam. cell. veg. = 2·5–3·5 μ; diam. heterocyst. = 5–6·5 μ; diam. spor. = 3·5–4 μ (an maturae?); diam. vaginæ = 6–7 μ.

Hab.—Gap pond, Winter Harbour; on ice, four feet above frozen watercourse, through "Penknife" ice, McMurdo Bay, September 13th, 1902.

This characteristic form was very abundant on the *Phormidium*-sheets from the Gap pond, on which it forms small oval or circular transparent discs (fig. 126), which may, apparently, later become detached, and exist in a free-floating condition. These discs are of all possible sizes, but I have seen none that exceeded 4 mm. in diameter. Numerous young colonies were observed and were found to be circular from the very first (figs. 123–125); the delicate but rather firm investment is immediately developed. In the mature thallus the much contorted trichomes (figs. 127, 128, 130) are loosely entangled (fig. 131). In rather rare cases a close-fitting mucilage-sheath could be discerned around the trichome (fig. 130). The heterocysts are nearly double the width of the vegetative cells and of rather varied shape (figs. 128, 130); most commonly they are single or in pairs. The ordinarily subglobose spores are formed in long chains (figs. 127, 129).

For a discussion of the position of this species, *see* under *N. longstaffi* sp. n.

59. Nostoc longstaffi,* sp. n.

(Pl. III., figs. 132–137.)

Thallo læte æruginco, impellucido, primo adnato, demum libere natante, forma disci tenuis ovalis vel circularis cum margine modice irregulari, non confluentis, diametro usque ad 12 mm.; trichomatibus dense intricatis, valde tortuosis, sæpe cum vaginis distinctis amplis hyalinis margine incrassata et inter cellulas constrictis; cellulis parvis, plerumque globosis vel interdum ellipsoideis (deplanatis doliformibus post divisionem), plerumque remotis, contentu homogeneo læte æruginco; heterocystis plus minusve globosis, solitariis, diametro trichomatis circiter duplo latioribus, membrana incrassata et contentu homogeneo; sporis globosis, membrana levi, confertis, in catenis longis dispositis; thallus peridermate tenui, paulo lamellato, et firmo (multo firmiore quam in *N. disciformi*) circumdatus est; thalli juvenales elongati sunt.

Diam. cell. veg. = 3–4 μ; diam. heterocyst. = 5–6 μ; diam. spor. = 5 μ; diam. vaginæ = 10–12 μ.

Hab.—Gap pond, Winter Harbour; freshwater pond in ice off Black Island, McMurdo Strait, December 31st, 1902; dry ponds, Winter Quarters, February, 1902.

This species has a great superficial resemblance to *N. disciforme* (*cf.* fig. 132), but there are important differences. The filaments are much more densely intertwined than in that species (fig. 137), and as a result the whole thallus acquires a coarser, opaque appearance, very different from that of the delicate transparent thalli of *N. disciforme* (*cf.* figs. 137 and 131, which show the thalli of the two species, magnified to the same extent). The envelope of the whole colony is also much coarser and firmer than the gelatinous investment of *N. disciforme*. These differences are sufficient to enable one to distinguish between the thalli of the two species with the naked eye.

The trichomes are very similar in the two species, but in *N. longstaffi* a wide mucilage-sheath is commonly found enveloping the individual trichomes (fig. 136). This sheath is far more distinct than that occasionally found in *N. disciforme*; it has a thickened outer edge and is often obviously constricted between the cells. The spores are absolutely spherical (fig. 135) and often form long chains, which were abundant on the surface of the *Phormidium*-sheets in several of the samples, being quite free from the colonies.

The young colonies appear to be quite different from those of *N. disciforme*. Those which I have seen were elongated (figs. 133, 134) with a heterocyst at one or both ends and the contained trichome was already closely wound. I have not been able to follow their further development.

The two species of *Nostoc* above described obviously belong to Bornet and Flahault's section *Cuticularia* (*see* Ann. Sci. nat., Bot., 7 sér., VII. (1888), p. 183). *N. disciforme* comes nearest to *N. maculiforme* Bornet et Flahault, but it differs from it in the

* Named after Mr. Longstaff, whose generous contribution rendered the expedition possible.

following respects: the very regular oval or circular shape of the thallus, the invariably loose arrangement of the trichomes, the narrow sheaths, the rather wider trichomes and in the spores. Unfortunately the authors give no details as to shape or size of the heterocysts.

N. longstaffi appears more nearly related to *N. cuticulare* (Bréb.) Born. et Flah., but there are striking differences, viz., the non-confluent thalli and the heterocysts, which are nearly double the size of the vegetative cells.

Bornet and Flahault's key to the species of this section may therefore be slightly modified as follows:—

Sect. 1.—Plantæ aquaticæ, maculiformes, adnatæ vel postea libere natantes, ambitu crescentes; fila laxe vel arcte contorta ..... CUTICULARIA.

(*a*) Trichomata 3–4 μ crassa, dense contorto-flexuosissima; sporæ sphæricæ.

Heterocystæ eadem forma et magnitudine ut articuli vegetativi vel paulo crassiores; sporæ sphæricæ 8–10 μ crassæ ..... *N. cuticulare.*

Heterocystæ diametro articuli vegetativi ca. duplo latiores; sporæ sphæricæ, 5 μ crassæ ..... *N. longstaffi*, sp. n.

(*b*) Trichomata 2·5–4 μ crassa, laxiora; sporæ sphæricæ vel depresso-globosæ, in longas catenas seriatæ.

Trichomata 3·5–4 μ crassa; sporæ sphæricæ sæpius 6 μ crassæ, in longas catenas seriatæ; heterocystæ? ..... *N. maculiforme.*

Trichomata 2·5–3·5 μ crassa; sporæ depresso-globosæ vel rarius globosæ, in catenis dispositis; heterocystæ diametro articuli vegetativi ca. duplo latiores ..... *N. disciforme*, sp. n.

60. NOSTOC HEDERULÆ.

Nostoc Hederulæ Meneghini; Bornet et Flah., *op. cit.*, vii. (1888), pp. 189–190 (*N. punctiforme* (Kütz.); Hariot, Journ. de Bot., v. (1891), p. 29).

Hab.—Gap pond, Winter Harbour (on *Phormidium*).

Minute colonies of very diverse shapes with very densely crowded filaments of more or less spherical cells.

61. NOSTOC FUSCESCENS sp. n.

(Pl. III., figs. 138–144.)

Thallo ab initio globoso, primo adnato (?), postea libere natante, flavo-fuscescenti, fusco vel nigro-fuscescenti, ætate provecta plus minusve cavo et interdum lacerato, diametro usque ad 10 mm., peridermate tenui levi mucoso facile lacerato circumdato; trichomatibus laxe intricatis, sæpe valde contortis, interdum parallelis; vaginis in thallis parvis et in partibus exterioribus thallorum seniorum distinctis, lamellatis, plerumque in duas regiones disjunctis, regione exteriore diffluenti hyalina vel dilute flavo-fuscescenti plus minusve inter cellulas constricta, regione interiore densiore distincte delimitata fusca vel nigro-fuscescenti et inter cellulas valde constricta (sæpe simili septationis), in partibus interioribus thallorum seniorum sæpe dilute flavo-

fuscescentibus vel hyalinis, non lamellatis; cellulis parvis, globosis vel interdum doliformibus, arcte vel laxe dispositis, contentu dilute æruginco, paulo granuloso; heterocystis plerumque non in vaginis inclusis, globosis aut interdum modice elongatis, etiam ellipticis finibus paulo acutis, diametro articuli vegetativi circiter duplo latioribus, plerumque singulis; sporis ignotis.

Diam. cell. veg. = 3–4 μ; diam. heterocyst. = 5–7 μ; long. heterocyst. = 6–7·5 μ.

Hab.—Gap pond, Winter Harbour.

This characteristic species was very obvious, owing to the dark colour of even relatively small colonies. The latter were often completely spherical (fig. 139), although young colonies of an elongated shape were not uncommon (figs. 143, 144); in the older colonies, owing to the central part becoming hollow, the thallus often appears flattened and may even become torn open and rather irregular. As no spores were observed, it is conceivable that the thallus may attain even larger dimensions than those given in the diagnosis.

The most striking feature lies in the highly developed sheaths of the trichomes (figs. 140–142). They are excellently developed in the young colonies, but are generally quite distinct also in the outer parts of the older colonies. The sheaths are sharply differentiated into two regions, an outer one, which is diffluent and hyaline or pale yellowish-brown, and an inner one, which is denser, sharply demarcated from the outer and of a brown or deep blackish-brown colour. This inner sheath shows very obvious constriction between the cells, often amounting to complete septation (figs. 139, 141, 142). In the inner parts of older colonies there is no differentiation in the sheath.

Although no spores were observed, young stages of this species were not uncommon. They consist of a rather dense tangle of filaments, already provided with well-marked brown sheaths (figs. 139, 144). Quite small colonies already possess an investment.

L. Gain has recently ("Deux espèces nouvelles de *Nostoc* provenant de la région antarctique sud-américain," Comptes Rendus, clii. (1911), pp. 1693–4) described a new species of *Nostoc* under the name of *N. pachydermaticum*, based on a single specimen. It is possible that *N. fuscescens* is identical with Gain's species, but there are certain striking differences. Thus Gain speaks of "articulis ellipticis, 2·5–3 μ crassis, 4–5 μ longis," whereas the cells of *N. fuscescens* are nearly or quite spherical; the sheaths are described as "amplis, mesentericis, fuscescentibus, 13–16 μ crassis," but there is no mention of their characteristic differentiation which, as Gain evidently had a very small colony before him, would have been very obvious. For these reasons I scarcely think that the two forms can be identical, and have preferred to describe the specimens from the Gap pond as a distinct species.

N. fuscescens will probably find its place in Bornet and Flahault's fourth section *Intricata*, most of the species of which are spherical at first and have coloured sheaths, although none show the striking differentiation characteristic of the Antarctic species.

The sheaths somewhat resemble those of *N. commune*. The species is also somewhat like *N. sphæricum* Vauch., but differs in the lax arrangement of the trichomes, and the presence of distinct sheaths.

62. ? Nostoc sphæricum.

Nostoc sphæricum Vaucher, Hist. d. Conferv. d'eau douce (1803), p. 223, Tab. XVI., fig. 2; Bornet et Flahault, *tom. cit.*, pp. 208–209.

Diam. cell. veg. = 3–4 μ; diam. heterocyst. = 5·5–6 μ.

Hab.—Freshwater pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903.

This form appeared as small colonies loosely attached to the surface of the Cyanophyceous sheets, or free-floating; the colonies were spherical or ellipsoidal (or slightly irregular as a result of mutual pressure) and up to 300 μ in diameter. Some of the colonies were yellowish or brownish, the colour apparently being due to the general mucilage. At many points large numbers of these small (and probably young) colonies were densely aggregated. The trichomes were rather loosely interwoven, the only respect in which the specimens differed from the published descriptions of the species. No spores were seen.

It seems possible that *N. borneti* Gain (*op. cit.*, pp. 1691–3) is a form of this species.

63. Nostoc commune.

Nostoc commune Vauch., *op. cit.*, p. 222, Tab. XVI., fig. 1; Bornet et Flahault, *op. cit.*, pp. 203–207.

Diam. trich. = 4·5–5 μ; diam. heterocyst. = 6–7 μ.

Hab.—Dry ponds, Winter Quarters, February, 1902; damp spots, Granite Harbour, New Bay, January 20th, 1902.

The thalli were irregularly folded, flat, membranaceous, and of a bright blue-green, olive or olive-brown colour. In parts of the colonies the flexuous filaments were densely aggregated. At some points pale brown sheaths were very conspicuous around the individual trichomes, being more or less constricted between the cells. In the bulk of the filaments the cells were nearly spherical or barrel-shaped, but at some points more elliptical. The heterocysts were also in rare cases somewhat elliptical in outline. Young stages were also present.

Genus Anabæna Bory.

64. Anabæna antarctica sp. n.

(Pl. II., figs. 118–120.)

Filis sæpe remotis, stratum definitum non formantibus, subrectis vel modice flexuosis, in superficie *Phormidii* epiphytis; vaginis arctis, sæpe inconspicuis; cellulis parvis globosis vel ovalibus, diametro 1–2plo longioribus; heterocystis globosis vel

doliformibus, singulis, contentu exiguo, diametro cellularum æqualibus; sporis in catenis dispositis, plerumque ab heterocystis remotis, cylindricis, interdum leniter curvatis, diametro 4–8plo longioribus, finibus rotundatis vel modice acutis, cyto plasmate cum granulis numerosis, membrana tenui levi.

Diam. cell. veg. = 5·5–7 μ; diam. heterocyst. = 5·5–7·5 μ; lat. spor. = 7·5–9 μ; long. spor. = (19)–48–58 μ.

Hab.—Gap pond, Winter Harbour, February 20th, 1904.

This species belongs to the section *Dolichospermum* and appears to be most nearly allied to *A. catenula* (Kütz.) Born. et Flah. It differs from the latter in being epiphytic, in the occasional presence of a narrow sheath, in the frequently oval shape of the vegetative cells (fig. 118), and especially in the spores. The latter do not show the faint constriction characteristic of *A. catenula*, and are longer and narrower (figs. 118–120); the ends are also different. The spores of *A. catenula* var. *americana* Collins, are somewhat more like those of *A. antarctica*, but there are still appreciable differences, as the spores of the latter cannot be described as strictly cylindrical.

Genus Nodularia Mertens.

65. Nodularia spumigena.

Var. minor var. nov.

(Pl. II., figs. 104–108.)

Nodularia spumigena Mertens, in Jürgens. Alg. Aquat. xv. (1822), No. 4; Bornet et Flahault, *tom. cit.*, pp. 245–246.

Filis solitariis, subrectis vel varie flexuosis, elongatis, finibus non attenuatis; vaginis tenuissimis, hyalinis, arctis, sæpe evanescentibus; trichomatibus leniter torulosis; cellulis planis plerumque longitudine duplo ad triplo latioribus, membrana tenui hyalina, contentu granulis sæpe magnis repleto; heterocystis transverso-ovalibus vel deplanatis, plerumque solitariis, sed interdum 2- vel 3-seriatis, paulo latioribus quam cellulis vegetativis, membrana modice incrassata, contentu ærugineo homogeneo; sporis?

Diam. cell. veg. = 5–5·5 μ; long. cell. veg. = 2·5–3·5 μ; diam. heterocyst. = 6·5-7 μ.

Hab.—Gap pond, Winter Harbour, February 20th, 1904 (epiphytic on *Phormidium*); dry ponds, Winter Quarters, February, 1902.

This form differs from var. *genuina* Born. et Flah., of *N. spumigena* Mertens, chiefly in its smaller dimensions; the trichomes are, however, not nearly as torulose as those of the type, and the thin sheath is highly diffluent, being often wanting. The heterocysts of the Antarctic variety agree very closely with those of var.

litorea (Kütz.) Born. et Flah. (figured by Bornet et Thuret, Notes algologiques, tab. XXIX.), the dimensions of which are, however, much greater.

There is also some resemblance to *N. harveyana* (Thwaites) Thuret, but the filaments of the Antarctic form do not taper at the ends, and the cells are much flatter.

66. Nodularia quadrata sp. n.

(Pl. II., figs. 109–115.)

Filis in stratum laxum dispositis, sæpe elongatis et modice flexuosis, interdum subrectis et parallelis, finibus vix attenuatis, cellula apicali rotundata vel plus minusve conica membrana sæpe modice incrassata; vaginis tenuibus, hyalinis, plerumque distinctis; cellulis deplanatis, longitudine 2–3plo latioribus, confertis, contentu læte ærugineo plus minusve granuloso; trichomatibus modice torulosis; heterocystis singulis, raro binis, quadratis, plerumque tam longis quam latis vel interdum paulo longioribus, rare modice deplanatis, diametro cellulis vegetativis paulo latioribus, membrana incrassata, contentu læte ærugineo homogeneo; sporis subglobosis, paulo longis quam latis, membrana levi, contentu granuloso.

Diam. cell. veg. = 3–4 μ; diam. vag. = 5–6 μ; diam. heterocyst. = 5–6 μ; diam. spor. = 7 μ; long. spor. = 8 μ.

Hab.—Freshwater pond in eskers upon ice, halfway between Black and Brown islands, January 3rd, 1903; pond in ice off Black island, McMurdo Strait, December 31st, 1902; growing in and through ice in pond among the eskers which border the shore of the Western Mainland, December 2nd, 1902.

The most striking characteristic of this species are the square heterocysts, which are unusual in the genus (figs. 109–111). As the figures show, the heterocyst is square or even slightly longer than broad (figs. 109–110), even in filaments in which the vegetative cells are prominently flattened. The apices of the filaments are not attenuated, but the apical cell is frequently long and more or less pointed, often having an approximately conical shape (figs. 112–114). Unfortunately only one case of spore-formation was seen, and I do not feel sure that this spore was mature; it was spherical with flat end-walls and had a thin membrane and granular contents (fig. 115).

The species probably stands nearest to *N. harveyana* (Thwaites) Thuret, but it differs from it in the non-attenuation of the filaments, in the shape of the heterocysts and in the generally flatter cells. The heterocysts somewhat resemble those of *N. tenuis* G. S. West ("Rep. Freshw. Alg., incl. Phytoplankton, of the Third Tanganyika Expedition, 1904–5," Journ. Linn. Soc., Bot., XXXVIII (1907), pp. 171–172), but this species differs in its short trichomes, the attenuation of the ends of the latter, and the square cells; the dimensions are also less than in *N. quadrata*.

BACILLARIEÆ.

COSCINODISCACEÆ.

Genus Melosira Ag.

67. Melosira sp.

(Pl. III., figs. 148, 149, 149*a*.)

Diam. cell = 7–9 μ; long. cell. = 12–13 μ.

Hab.—On *Phormidium* on ice, four feet above frozen watercourse through "Penknife ice," McMurdo Bay, September 13th, 1902.

I have not been able to come to any satisfactory conclusions about the determination of this form. It occurred rarely (but then in considerable masses) on the surface of *Phormidium* at the above locality, and was always found dead. The valves were, in most cases, hemispherical, perfectly smooth (*i.e.* without markings of any kind), and there was generally a prominent constriction at the point of junction of the two valves (*cf.* the figures). Occasionally the line of junction of the valves showed a punctate structure like a number of minute interlocking teeth (fig. 149*a*). Frequently the length of the valve was nearly equal to its breadth (fig. 149*a*), but sometimes the cells were appreciably longer (fig. 148) than wide.

The frustules were generally isolated, as in the section *Podosira* of the genus; but it does not appear to be related to any of the described species of that section. It is most like *P. montagnei* Kütz., a much larger form, which has markings on its valves. It may well be, however, that the frustules had fallen apart in the dead material, and that our form belongs to the section *Lysigonium*.

The characters of the frustules agree fairly well with the descriptions of *M. subflexilis* Kütz., given by Rabenhorst (Fl. Europ. Alg., i. (1864), p. 39) and Migula (Kryptogamenflora v. Deutschland, Deutsch-Österreich, etc., ii., 1 (1907), p. 153), but Kützing's figure (Bacill. (1844), Tab. 2, fig. xiii.) shows the valves as far less convex than in the Antarctic form; there is also practically no constriction and no indication of teeth at the line of junction of the valves (*cf. op. cit.*, Tab. 2, fig. vi. of *M. italica*). Species like *M. lineata* (Dillw.) Ag., and *M. salina* Kütz., should also be compared. It is possible that the Antarctic form is a new species, but the material was too inadequate to enable one to arrive at a definite conclusion on this point.

Genus Coscinodiscus Ehrenb.

68. Coscinodiscus decipiens.

(Pl. III., fig. 151.)

Coscinodiscus decipiens Grun., Diat. Franz Josefs Land, Denkschr. Ak. Wiss. Wien, xlviii. (1884), p. 85 ; Van Heurck, Synops. Diat. Belg. (1880–85), Pl. XCI., fig. 10.

Diam. valv. = 18 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (isolated).

The specimens agreed well with Van Heurck's figure. In the central part of the valve the punctæ are large and widely separated, but they gradually become smaller and more densely crowded towards the edge. The margin bears twelve short spines, symmetrically arranged. The valves are markedly convex.

69. Coscinodiscus lacustris.

Coscinodiscus lacustris Grun., *op. cit.*, p. 33, Pl. D, fig. 300 ; Van Heurck, *op. cit.*, p. 218, Suppl. Pl. C, fig. 42.

Diam. valv. = 30 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (isolated).

70. Coscinodiscus griseus.

Var. gallapagensis.

Coscinodiscus griseus Greville, Quart. Journ. Micr. Sc. (1863), p. 230, Tab. IX., fig. 7 ; var. *gallapagensis* Grun. in Van Heurck, *op. cit.*, Pl. CXXXII., fig. 1.

Diam. valv. = 57 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (isolated).

Unfortunately only a single specimen of this form was seen, and that was lost before it was drawn. All attempts to find further specimens proved unsuccessful. The single valve seen, however, agreed in every respect with Van Heurck's figure, and I feel convinced that the determination is correct.

Genus Cyclotella Kütz.

71. Cyclotella operculata.

(Plate III., fig. 150.)

Cyclotella operculata Kütz., Bacill. (1844), p. 50, Tab. I., fig. 1 ; Van Heurck, *op. cit.*, Pl. XCIII., fig. 22.

Diam. valv. = 20–38 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (isolated).

I have seen too few specimens of this form to feel sure of its determination. The central region of the valve was in part quite without markings of any kind, in part provided with irregular granulation, much as in West's figure (Brit. Freshw. Alg. (1904), p. 277, fig. 127, B).

FRAGILARIACEÆ.

Genus Fragilaria Lyngb.

72. Fragilaria curta.

(Pl. III., fig. 147.)

Fragilaria curta Van Heurck, Résult. du voyage du S.Y. 'Belgica,' Bot., Diatomées (1909), p. 24, Pl. III., fig. 37.

Long. valv. = 19 μ; lat. valv. = 6 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (isolated).

The specimens agreed in all respects with Van Heurck's description and figure. The valve is very slightly wider at one end than at the other. The striæ are interrupted in their transverse course by a scarcely perceptible division, the last three or four at each end being curved.

73. ? Fragilaria linearis.

Fragilaria linearis Castracane, 'Chall.' Rep., Diatom. (1886), p. 56, Pl. XXV., fig. 12.

Long. valv. = 38 μ; lat. valv. = 6·5 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (isolated).

74. Fragilaria obliquecostata.

Fragilaria obliquecostata Van Heurck, *op. cit.*, p. 25, Pl. III., fig. 38.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 (mostly only broken valves).

75. Fragilaria tenuicollis.

Var. antarctica.

Fragilaria tenuicollis Heib., Consp. crit. Diat. danic. (1863), fig. XIII.; Rabenhorst, Fl. Europ. Alg., i. (1864), p. 119.

Var. *antarctica* W. and G. S. West, *op. cit.*, p. 279, Pl. XXVI., fig. 128.

Long. valv. = 37–46 μ; lat. valv. = 3–3·5 μ.

Hab.—Damp spot, summit of Cape Adare, January 9th, 1902; on ice, four feet above frozen watercourse through "Penknife ice," McMurdo Bay, September 13th, 1902; pond in ice off Black Island, McMurdo Strait, December 31st, 1902.

This form was relatively abundant. Many of the valves were rather longer than those recorded by Messrs. West.

TABELLARIACEÆ.

Genus Denticula Kütz.

76. Denticula tenuis.

Var. antarctica var. nov.

(Pl. III., figs. 156, 157.)

Denticula tenuis Kütz., Bacill. (1844), p. 43, t. 17, fig. VIII.; Smith, Brit. Diatom., ii. (1856), p. 20, Pl. XXXIV., fig. 293.

D. parva valvis late ellipticis apicibus rotundatis; costis transversis validis, 6–7 in 10 μ, in media parte rectis, sed polos versus gradatim plus minusve curvatis; inter binas costas sunt duæ series punctarum subtilium, circa 6–7 in quaque serie in media parte valvarum; polos versus punctæ in quaque serie fiunt minus crebræ.

Long. valv. = 18–23 μ; lat. valv. = 7–8 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902; on ice, four feet above frozen watercourse through "Penknife ice," McMurdo Bay, September 13th, 1902.

This was a relatively rare form, of which not many specimens were seen.* The new variety resembles var. *frigida* Grun. (= *D. frigida* Kütz.) in some respects, but in the latter the number of costæ is not as great as in var. *antarctica*, the costæ are not curved near the poles of the valves, and there are more than two rows of dots between each pair of ribs. There is also resemblance to var. *inflata* Grun. (= *D. inflata* W. Smith), in which Smith (*op. cit.*, Pl. XXXIV., fig. 294) figures many of the costæ as curved (*cf.*, however, Van Heurck, Synopsis Diat. Belg. (1880–85), Pl. XLIX., figs. 32, 33), but the curvature is different, as the convex surface faces towards the poles, whereas in var. *antarctica* it is the concave surface.

In some of the valves the costæ near the two ends were curved more towards one side than the other (fig. 156), leading to a certain degree of asymmetry.

* The form here described bears an appreciable resemblance to the figure of *Fragilaria antarctica* Castracane, given by Castracane ('Chall.' Rep., Diat. (1886), Pl. XXV., fig. 12); this figure shows the same characteristic paired rows of dots between each two ribs, and the general shape of the valve is also the same. The ribs are, however, much more delicate and are scarcely curved at the ends of the valves. Van Heurck's figure (*op. cit.*, 1909, Pl. III., fig. 48) shows nothing of the punctulations. Some doubt may be felt as to whether the valve figured by Castracane really belongs to the genus *Fragilaria*.

DIATOMACEÆ.

Genus Diatoma D.C.

77. Diatoma elongatum.

Var. ehrenbergi.

(Pl. III., figs. 152, 152a.)

Diatoma elongatum Ag., Syst. Alg. (1824), p. 24; Kütz., Bacill. (1844), p. 48, t. 17, fig. xviii., 1, 2.
Var. *ehrenbergii* (Kütz.) W. Sm., Brit. Diat. ii. (1856), pp. 40–41, Pl. XLI., fig. 311 *β* (*D. ehrenbergii* Kütz., Bacill. (1844), t. 17, fig. xvii., 1–3).

Long. valv. = 26–32 *μ*.

Hab.—On ice, four feet above frozen watercourse through "Penknife ice," McMurdo Bay, September 13th, 1902.

This variety has already been recorded from the Antarctic by Van Heurck (*op. cit.*). The ends of the frustules often appeared somewhat rounded in girdle-view (fig. 152).

ACHNANTHACEÆ.

Genus Achnanthes Bory.

78. Achnanthes brevipes.

Var. intermedia.

Achnanthes brevipes Ag., Syst. Alg. (1824), p. 1.
Var. *intermedia* (Kütz.) Cleve, Synops. Navic. Diat., ii. (1895), p. 193 (*A. subsessilis* Kütz.).

Long. valv. = 30–31·5 *μ*; lat. valv. = 9–9·5 *μ*.

Hab.—On *Phormidium* on ice, four feet above frozen watercourse through "Penknife ice," McMurdo Bay, September 13th, 1902 (rare).

The specimens agreed in all respects with those described and figured by Messrs. West (*op. cit.*, p. 280, Pl. XXVI., figs. 126–127).

NAVICULACEÆ.

Genus Stauroneis Ehrenb.

79. Stauroneis anceps.

Var. amphicephala.

Stauroneis anceps Ehrenb., Verbr. u. Einfl. d. mikr. Lebens, etc. (1843), p. 134, Tab. II., 1, fig. 18; Smith, Brit. Diat., i. (1853), p. 60, Tab. XIX., fig. 190.
Var. *amphicephala* Kütz., Bacill. (1844), p. 105, Tab. 30, fig. 25.

Long. valv. = 28 *μ*; lat. valv. = 8 *μ*.

Hab.—Freshwater pond, Granite Harbour, January 20th, 1902 (rare).

Genus Navicula Bory.

80. Navicula muticopsiformis.

Navicula muticopsiforme W. and G. S. West, *op. cit.*, p. 284, Pl. XXVI., fig. 131.

Long. valv. = 12·5 μ; lat. valv. = 5·5 μ.

Hab.—Freshwater pond, Granite Harbour, January 20th, 1902 (rather rare).

81. Navicula seminulum.

(Pl. II., figs. 97, 98.)

Navicula Seminulum Grun., Verhandl. k.k. zool.-bot. Ges., Wien (1860), p. 552, Tab. II., fig. 2; Van Heurck, Synops. Diat. Belg. (1880–85), p. 107, Pl. XIV., fig. 9.

Long. valv. = 16–20 μ; lat. valv. = 4·5–5 μ.

Hab.—On ice, four feet above frozen watercourse through "Penknife ice," McMurdo Bay, September 13th, 1902; pond in ice, off Black Island, McMurdo Strait, December 31st, 1902; in freshwater ice under boulder, Cape Adare, January 9th, 1902.

The valves of this fairly common form were obviously swollen in the middle, and very gradually tapered from there towards the two ends, which were occasionally very faintly capitate. The striæ were in many cases a little further apart in the middle of the valve than elsewhere, in which respect the specimens approached *N. minima* Grun., but the shape of the valve in this species is rather different.

82. Navicula muticopsis.

Navicula muticopsis Van Heurck, Diatomées, Résult. d. voyage du S.Y. 'Belgica' (1909), p. 12, Pl. II., fig. 181.

Long. valv. = 13–25 μ; lat. = 7–9 μ.

Hab.—Pond, Cape Adare, January 9th, 1902; on ice, McMurdo Bay, September 13th, 1902; pond in ice, off Black Island, McMurdo Strait, December 31st, 1902; Gap pond, Winter Harbour; freshwater pond, Granite Harbour; pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903; in ice, under boulder, Cape Adare, January 9th, 1902.

This is certainly one of the most widely distributed of Antarctic Diatoms. Both of the forms recorded by Messrs. West (*op. cit.*, pp. 283–284) were of wide occurrence.

83. Navicula cymatopleurus.

(Pl. II., fig. 101.)

Navicula cymatopleura W. and G. S. West, *op. cit.*, p. 285, Pl. XXVI., figs. 133, 134.

Long. valv. = 24–30 μ; lat. valv. = 4–5·5 μ.

Hab.—On ice, four feet above frozen watercourse, through "Penknife ice,"

McMurdo Bay, September 13th, 1902 ; pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903 ; pond in ice off Black Island, McMurdo Strait, December 31st, 1902 ; on ice, under boulder, Cape Adare, January 9th, 1902.

This also is widely distributed. Some of the specimens were rather larger than those recorded by Messrs. West. The intermediate swellings (*i.e.*, those between the central one and the subcapitate extremities) are often scarcely perceptible.

84. Navicula borealis.

(Pl. III., fig. 153.)

Navicula borealis (Ehrb.) Kütz., Bacill. (1844), p. 96, Tab. 28, figs. 68 and 72 ; Van Heurck, Synops. Diat. Belg., p. 76, Pl. VI., fig. 3.

Long. valv. = 30 μ ; lat. valv. = 8 μ.

Hab.—Pond some distance behind hut, Cape Adare, January 9th, 1902 ; freshwater pond, Granite Harbour, January 20th, 1902.

This species was not as abundant as in the South Orkneys.

85. Navicula shackletoni.

Navicula shackletoni W. and G. S. West, *op. cit.*, p. 286, Pl. XXVI., figs. 136–138.

Long. valv. = 27–40 μ ; lat. valv. = 5–6·5 μ.

Hab.—On ice, McMurdo Bay, September 13th, 1902 ; pond in eskers upon ice, half-way between Black and Brown Islands, January 3rd, 1903 ; pond in ice off Black Island, McMurdo Strait, December 31st, 1902 ; freshwater pond, Granite Harbour, January 20th, 1902.

This species is almost as widely distributed as *N. muticopsis* Van Heurck. As the above measurements show, some of the individuals were appreciably larger than those described by Messrs. West. Both the type and the var. *pellucida* were common.

86. Navicula murrayi.

Navicula murrayi W. and G. S. West, *op. cit.*, p. 285, Pl. XXVI., fig. 129.

Long. valv. = 43 μ ; lat. valv. = 10 μ.

Hab.—Gap pond, Winter Harbour, rare.

87. Navicula globiceps Greg.

(Pl. III., figs. 154, 155.)

Navicula globiceps Greg., Microsc. Journ., iv. (1856), p. 10, t. 1, fig. 34 ; Van Heurck, *op. cit.*, p. 79, Suppl. Pl. A, fig. 13.

Long. valv. = 22–38 μ ; lat. valv. in media parte = 9·5–12 μ.

Hab.—On ice, McMurdo Bay, September 13th, 1902 ; pond in eskers upon ice,

half-way between Black and Brown Islands, January 3rd, 1903; pond in ice off Black Island, McMurdo Strait, December 31st, 1902.

Next to *N. muticopsis* and *N. shackletoni* this was the most abundant Diatom. There are obviously two well-marked forms of this species; this the published figures of the species already show, *cf.* for instance the figure of Messrs. West (*op. cit.*, Pl. XXVI., fig. 135), Van Heurck's figure (*op. cit.*, Suppl. Pl. A, fig. 13), Wolle's figure (Diatom. of North America (1890), Pl. IX., fig. 33), and Migula's figure (*op. cit.*, Pl. 7G, fig. 6). The one form is relatively short with a strongly bulged median portion and prominently capitate extremities (fig. 154); the other is longer, the median part is not so strongly inflated, and the capitate character of the apices is far less pronounced (fig. 155). The var. *elegans* of *N. murrayi* W. and G. S. West (*op. cit.*, p. 285, Pl. XXVI., fig. 130) comes very close to this form.

The two forms may be described as follows:—

f. *amphicephala* (fig. 154). Valvis diametro 2½plo longioribus, in media parte valde inflatis, polis valde capitatis. Long. valv. = 22–25 μ; lat. valv. in media parte = 9·5–10 μ.

f. *elongata* (fig. 155). Valvis diametro 3plo longioribus, in media parte inflatis, apicibus subcapitatis vel plus minusve capitatis. Long. valv. = 35–38 μ; lat. valv. in media parte = 10–12 μ.

Fig. 155 represents a very extreme form of f. *elongata*.

Many of the specimens of *N. globiceps* showed the interruption by one or two longitudinal lines of the striæ, as described and figured by Messrs. West. In other cases, however, I was unable to convince myself that this was the case, the striæ appearing uniformly punctate (figs. 154, 155).

88. Navicula stauropteroides sp. n.

(Pl. II., figs. 99, 100.)

N. parva, valvis sublinearibus, diametro 6–7plo longioribus, in media parte leniter et late tumidis, polis late rotundatis vel subcapitatis, area centrali magna elongato-elliptica, platea axiali subangusta, striis levibus, 20–21 in 10 μ, in parte mediana (adversus plateam centralem) brevioribus et radiatis, polos versus valde convergentibus et gradatim abbreviatis.

Long. valv. = 37–39 μ; lat. valv. in media parte = 5–6 μ.

Hab.—On ice, McMurdo Bay, September 13th, 1902.

This species was rather rare. In general appearance it is much like a small specimen of *N. stauroptera* Grun., from which, apart from its smaller size, it differs in the non-curvature of the raphe at the apices of the valves, in the closer placing of the striæ, in the presence of short striæ around the central area and in the absence of striæ at the extreme ends. It should also be compared with *N. gibba* (Ehrb.) Kütz., which is again a larger form; it also differs in having more markedly capitate poles, in the

curvature of the raphe at the ends of the valves, and in the widely separated striæ. Some of the specimens (fig. 100) of *N. stauropteroides* showed practically no dilation of the poles of the valves.

NITZSCHIACEÆ.

Genus Hantzschia Grun.

89. Hantzschia amphioxys.

Hantzschia amphioxys (Ehrenb.) Grun., in Cleve and Grunow, Arct. Diat., K. Sv. Vet.-Ak. Handl., XVII. (1880), No. 2, p. 103.

Long. valv. = 37–42 μ; lat. valv. = 7–8 μ.

Hab.—Freshwater pond, Granite Harbour, January 20th, 1902.

90. Hantzschia elongata.

Hantzschia elongata (Hantzsch) Grun., in Cleve and Grunow, *op. cit.*, p. 104; Van Heurck, *op. cit.*, p. 169, Pl. LVI., figs. 7 and 8.

Long. 176 μ; lat. 10 μ.

Hab.—Gap pond, Winter Harbour; rare.

SURIRELLACEÆ.

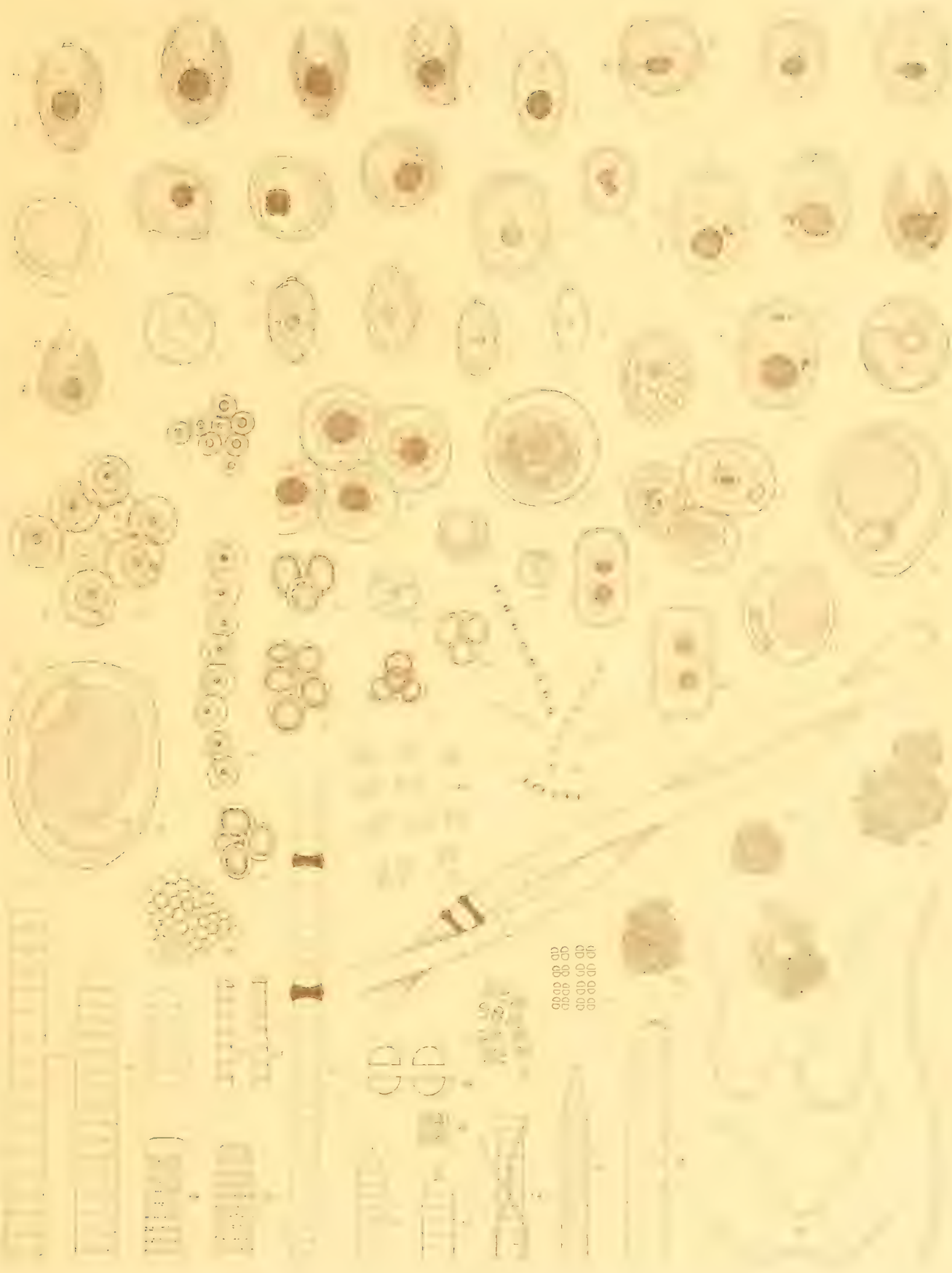
Genus Surirella Turpin.

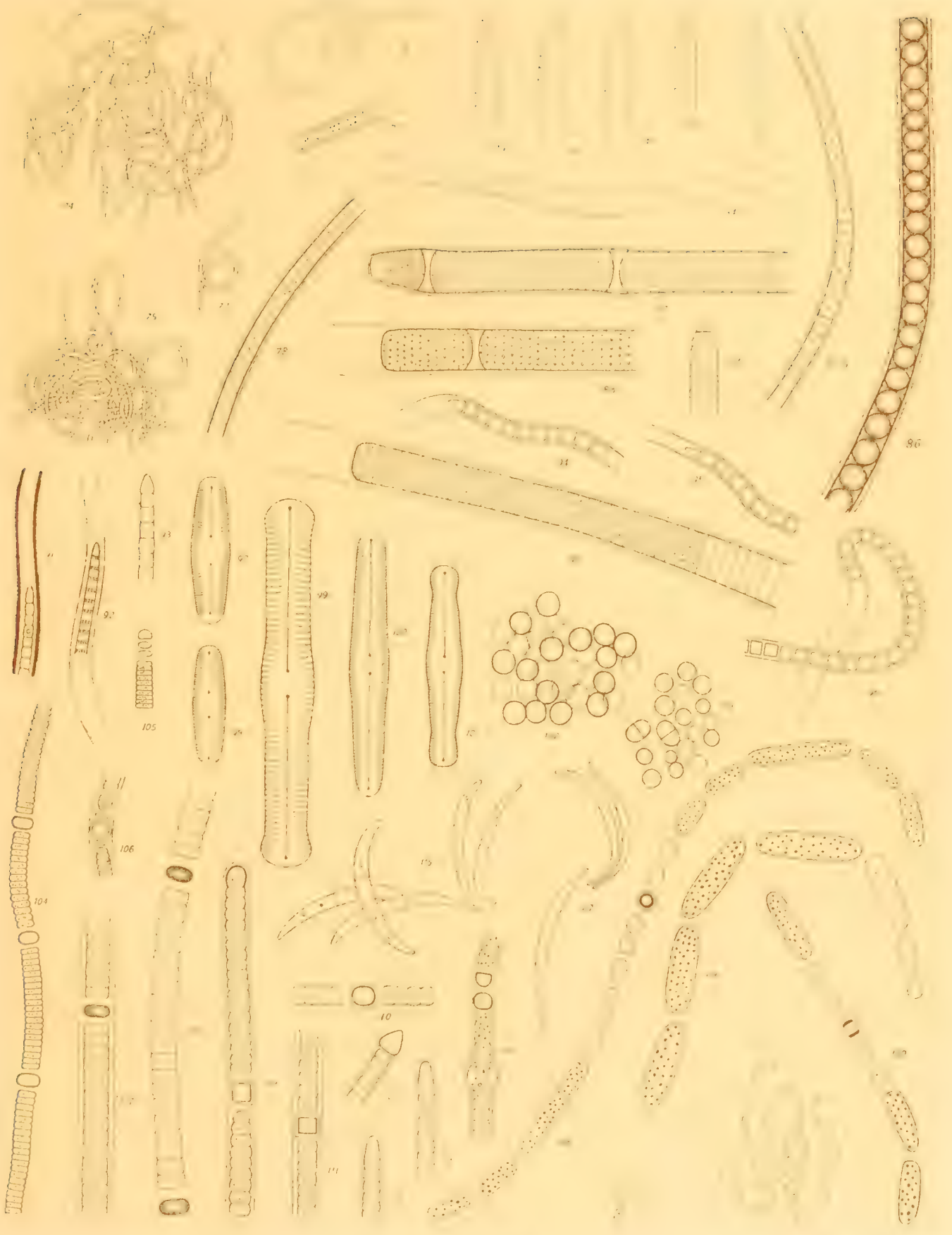
91. Surirella angusta.

Surirella angusta Kütz., Bacill. (1844), p. 61, Tab. 30, fig. 52.

Long. valv. = 30 μ; lat. valv. = 8 μ.

Hab.—In freshwater ice under boulder, Cape Adare, January 9th, 1902.





Proc. Rochester Acad. Pl. II

Antarctic (Discovery) Exp. Freshwater Algæ Pl. III.

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PLATE I.

FIGS. 1–5.—*Chlamydomonas subcaudata* Wille, ordinary individuals, *cf.* description, pp. 7, 8; *p*, pyrenoid; *n* = nucleus. (× 700.)

FIGS. 6–10.—*Chlamydomonas subcaudata* Wille, encysted individuals. In figs. 6 and 7 the original shape of the mother-cell membrane is easily recognised; in figs. 8–10 the cysts show the processes described on p. 8; *p* = pyrenoid; *n* = nucleus. (× 700.)

FIGS. 11–14.—*Chlamydomonas subcaudata* Wille, free cysts; in fig. 14 the cyst contains two pyrenoids. (× 700.)

FIGS. 15–18.—*Chlamydomonas intermedia* Chod., ordinary individuals; *p* = pyrenoid; *n* = nucleus; *c* = contractile vacuole; *s* = stigma. (× 1350.)

FIG. 19.—*Chlamydomonas ehrenbergi* Gorosch., ordinary individual; *p* = pyrenoid; *n* = nucleus. (× 700.)

FIG. 20.—*Chlamydomonas subcaudata* Wille, cyst showing division of contents into four parts. (× 700).

FIGS. 21–25.—*Chloromonas alpina* Wille; *n* = nucleus; *s* = eye-spot. In most of the individuals the cilia could not be traced to their full length. (× 1350.)

FIG. 26.—*Pleurococcus antarcticus* W. and G. S. West, f. *typica*; *o* = oil-globules. (× 550.)

FIG. 27. „ „ „ „ f. *minor*. (× 550.)

FIG. 28. „ „ „ „ f. *filamentosa*. (× 550.)

FIG. 29. „ „ „ „ f. *stellata*. (× 800.)

FIGS. 30, 31, 33. „ „ „ f. *simplex*; *o* = oil-globules. (× 550.)

FIG. 32. „ „ „ „ f. *typica*, a group of appreciably larger cells than those in Fig. 26. One of these cells has two pyrenoids. (× 400.)

FIGS. 34–35.—*Pleurococcus antarcticus* W. and G. S. West, f. *robusta*, elliptical cells. (× 500.) These are relatively small cells of this form.

FIG. 36.—*Pleurococcus koettlitzi* sp. n., group of cells seen at a low magnification. (× 220.)

FIGS. 37–42.—*Pleurococcus koettlitzi* sp. n.; 37, 39, 41, ordinary tetrads; 38, small part of group shown in fig. 36; 40, development of daughter-cells within mother-cell; 42, development of daughter-cells within mother-cell,—some of the cells of the tetrad are abortive. (39, 40 × 500; other figures × 400.)

FIGS. 43, 44.—*Pleurococcus frigidus* W. and G. S. West. (× 400.)

FIGS. 45, 46.—*Penium* sp., *cf.* pp. 20, 21. (× 500.)

FIGS. 47, 48.—*Eucapsis minuta* sp. n. 47, Surface view of an older colony to show grouping of cells (× 1800); 48, Diagram of eight cells of colony to show the cubical arrangement (magnified about 4000 times).

FIGS. 49–51.—*Merismopedia tenuissima* Lemm.; 49, young colony; 50, 51, older colonies. (× 1400.)

FIG. 52.—*Phormidium frigidum* sp. n. (× 1800.)

FIGS. 53, 54.—*Phormidium autumnale* (Ag.) Gom., apices of two filaments. (× 700.)

FIGS. 55–59.—*Oscillatoria koettlitzi* sp. n.; 55, 57, 58 are typical trichomes. (× 700.)

FIGS. 60–64.—*Oscillatoria simplicissima* Gom., var. *antarctica* var. n.; 62, f. *acuminata*; 61, f. *spiralis*; 64, trichome overgrown by filaments of *Phormidium angustissimum*. (× 550.)

FIG. 65.—*Oscillatoria producta* W. and G. S. West. (× 800.)

FIG. 66. „ *subproboscidea* W. and G. S. West. (× 800.)

FIGS. 67–70.—*Microcystis parasitica* Kütz. (× 700.)

FIGS. 71–73.—*Phormidium antarcticum* W. and G. S. West, forma. (71, 72, × 850; 73, × 1800.)

PLATE II.

FIGS. 74–78.—*Lyngbya lagerheimi* (Möb.) Gomont; 74, 75, typical portions of the stratum; 76, 77, two filaments from the stratum, showing spiral coiling; 78, a single filament on a larger scale with the contained trichome. (74–77, × 500; 78, × 1200.)

FIGS. 79–84.—*Lyngbya attenuata* sp. n.; 79–83, different types of apex of the trichomes; 84, a filament. (× 800.)

FIGS. 85–86.—*Lyngbya æruginea-cærulea* (Kütz.) Gom.; 85, 85*a*, normal filament (× 700); 86, filament with gonidia (× 800).

FIGS. 87–90.—*Lyngbya æstuarii* (Mertens) Liebm., var. *antarctica* var. nov. *See* p. 27. (87, × 800; 88–90, × 700.)

FIGS. 91–93.—*Lyngbya scotti* sp. n. (91, 92, × 700; 93, × 1200.)

FIGS. 94–96. „ „ „ var. *minor* var. nov. (× 1350.)

FIGS. 97–98.—*Navicula seminulum* Grun. (× 1250.)

FIGS. 99–100. „ *stauropteroides* sp. n. (99, × 1800; 100, × 1250.)

FIGS. 101. „ *cymatopleurus* W. and G. S. West. (× 1250.)

FIGS. 102–103.—*Microcystis chroococcoidea* W. and G. S. West. (× 800.)

FIGS. 104–108.—*Nodularia spumigena* Mertens, var. *minor* nov. var. (104–106, × 800; 107–108, × 1300.)

FIGS. 109–115.—*Nodularia quadrata* sp. n. 112–114 show different types of apices; 115 shows filament with a probably immature spore. (× 800.)

FIGS. 116–117.—*Dactylococcopsis rhaphidioides* Hansg. The group in fig. 116 shows a distinct septum in several of the cells. (× 800.)

FIGS. 118–120.—*Anabæna antarctica* sp. n., filaments with spores; the smaller spores in fig. 118 are probably immature. (× 500.)

FIGS. 121–122.—*Dactylococcopsis antarctica* sp. n.; 121, small part of the colony; 122, a cell in process of division. (× 1350.)

PLATE III.

FIGS. 123–125.—*Nostoc disciforme* sp. n., young colonies. (123, × 140; 124–125, × 500.)
FIG. 126.—*Nostoc disciforme* sp. n., thalli. (Natural size.)
FIGS. 127–130.—*Nostoc disciforme* sp. n. 127, 128, two filaments; 127, with spores; 129, two groups of spores; 130, filament with sheath. (127, 128, 130, × 500; 129, × 700.)
FIG. 131.—*Nostoc disciforme* sp. n., small part of a mature thallus. (× 30.)
FIG. 132.—*Nostoc longstaffi* sp. n., thalli. (Natural size.)
FIGS. 133–134.—*Nostoc longstaffi* sp. n., young colonies. (× 500.)
FIGS. 135–136. „ „ „ filaments with spores. (135, × 700; 136, × 500.)
FIG. 137. „ „ „ small part of a mature thallus. (× 30.)
FIG. 138.—*Nostoc fuscescens* sp. n., thalli. (Natural size.)
FIG. 139. „ „ „ a young thallus. (× 400.)
FIGS. 140–142. „ „ filaments. (140, 142, × 700; 141, × 500.)
FIGS. 143–144. „ „ young thalli. (× 800.)
FIGS. 145–146.—*Tolypothrix conglutinata* Borzi. 145, a small part of the richly branched filament; 146, the end of one of the branches. (× 500.)
FIG. 147.—*Fragilaria curta* Van Heurck. (× 1350.)
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FIG. 150.—*? Cyclotella operculata* Kütz. (× 550.)
FIG. 151.—*Coscinodiscus decipiens* Grun. (× 1250.)
FIGS. 152 and 152*a*.—*Diatoma elongatum* Ag., var. *ehrenbergi* (Kütz.) W. Sm.; 152, girdle-view; 152*a*, valve-view. (152, × 1950; 152*a*, × 1350.)
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FIGS. 156, 157.—*Denticula tenuis* Kütz. var. *antarctica* var. nov. (156, × 1250; 157, × 1500.)
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FIGS. 161–163.—*Calothrix antarctica* sp. n.; 161, 162, filaments showing false branching. (161, 162, × 400; 163, × 550.)
FIGS. 164–172.—*Calothrix gracilis* sp. n. 164, filament showing false branching; 165, 172, typical filaments; 166, 167, base of two filaments, showing inflation; 170, part of a filament showing an intercalary heterocyst; 171, base of filament with a subconical heterocyst. (164, 165, × 500; 166–169, 171, 172, × 700; 170, × 1200.)

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At the suggestion of the Director the subjoined alphabetical indices have been prepared to show students in which volume they may find memoirs in which they are particularly interested. Owing to the fact that the memoirs were submitted to the Editor at very various times, and as it was important to publish them as soon as possible after their reception, the fifty memoirs in the five volumes of "Zoology and Botany" necessarily deal with subjects not closely allied in any systematic arrangement.

F. J. B.

February 16th, 1912.

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Simpson, J. C. (Echinoderm Larvæ)	IV.
Smith, E. A. (Amphineura)	II.
„ (Brachiopoda)	II.
„ (Gastropoda)	II.
„ (Lamellibranchiata)	II.
Tattersall, W. M. (Schizopoda)	IV.
Thiele, J. (Leptostraca)	III.
Timms, H. Marett (Seal Embryos)	V.
Traunfels, R. R. v. Stummer- (Myzostomidæ)	IV.
Trouessart, E. L. (Acari)	III.
Walker, A. O. (Amphipoda)	III.
Wilson, E. A. (Aves)	II.
„ (Mammalia)	II.
Wolfenden, R. N. (Copepoda)	IV.

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